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OBITUARY NOTE—NICHOLAS H. RIDGELY.

Perhaps not one in twenty of our readers on first glance at the line which heads this brief obituary notice will immediately identify or locate the connection of the late Nicholas H. Ridgely with the development of the gas business in the West. A slight pressure on their memories, however, may be trusted to soon recall the name of Wm. Ridgely, and spontaneously his will be coupled with that of Wm. H. Odiorne, whereupon is unfolded to the examiner's mental vision the beautiful city of Springfield, Illinois. While some may doubt the urgency or appropriateness of making especial reference here to the demise of one comparatively unknown to the great mass of the fraternity, we nevertheless feel not only justified but actually obliged to place before you a brief record of the life of one who, honored at home and respected abroad, best illustrates a type of manhood whose earlier imprints are still bright and clear cut on the pages of the history of our craft. In the hurry of to-day those who bore the brunt of the burden of the earlier struggles are apt to be forgotten, for the time at least; but their final leavetaking rarely fails to cause the busiest modern some moments of reflection wherein he pays sincere tribute to the pioneers whose sturdy strokes and indomitable courage served to pave the way over which the man of to-day treads on to success.

Nicholas H. Ridgely was born in Maryland, not far from Baltimore, on April 27, 1800, where the earlier years of his manhood were spent in building up within him a knowledge of sound commercial principles, particularly those connected with banking and financial matters. In 1828 the mighty West, then indeed but a puny infant in the general commerce of the States, acted as the magnet which attracted him to St. Louis, where he assumed a responsible position in connection with the old United States Bank of that city. In May, 1835, the combined call of duty and interest summoned him to Springfield, Ills., then but a straggling village, which gave residence to a population of less than 3,500 souls. Here he assumed the position of cashier of the State Bank of Illinois, and two years thereafter Springfield was made the capital of the State, and was elevated to the dignity of a city in 1840. From thenceforward Springfield grew in importance, wealth and beauty, and with every forward stride in its development the name of Nicholas H. Ridgely is closely interwoven. Railroad and telegraphic communication with the balance of the country was instigated and fostered by his careful methods, and mainly through his instrumentality the first public school in Springfield, yet known to many a resident of the city as the old Academy, was established. Looking at the numerous and well equipped places of tuition now in operation in Illinois' most charming city, it is hard to reconcile the records of its past with the portrait of its present; but such a comparison does the history of the place make plain. In 1841 the State Bank was placed in charge of a committee of three (of which Mr. Ridgely was one), and in 1852 the institution was wound up. In connection with eastern capitalists he became interested in Clark's Exchange Bank, which concern, in 1856, came entirely under the control of the deceased, who carried on a private banking business on his own behalf. In 1858 his son Charles was admitted to a partnership, subsequently enlarged by the admission of another son (William), the firm name being N. H. Ridgely and Co. In 1866 the Ridgely National Bank was organized, and deceased remained as President thereof to the last. In 1854 Mr. Ridgely secured a charter for the Springfield Gas Light Company, and from the date of its birth to the day of his death deceased figured as its chief executive. The history of this Company, showing, as it does, a record of unbroken prosperity and fair dealing, need not here be repeated, for it is familiar to every Western gas maker, and many an Eastern one besides. It is pleasant to know that those who follow him in the possession of this trust are true sons of a worthy father,

and to whom the intricacies of its management are as open pages because of their long familiarity with them.

Perhaps the language of a local writer, in commenting upon the personal traits of the deceased, will best serve to show how he was regarded by those who were his close associates:

"He was emphatically of a modest and retiring disposition. From his first entrance into Springfield he was brought in close contact with the noted public men of the State"—deceased was a warm personal friend of the martyred Lincoln—"and, as might be expected, he therefore exerted an important influence on legislative matters, particularly those which partook of a financial nature. High public position was frequently within his easy reach, but he preferred the seclusion of his home and the tender homage of his family to the blandishments of actual public political elevation. In fact, so closely had he confined himself to his own home of late years that it is doubtful if he were even known to many of the younger people of the city. Having now passed away, his children proudly recall his honorable record, for they can, in pointing to his business career of 60 years, assert there is nothing in it for which apology is necessary. In his whole life he was never even accused of doing a single dishonorable deed. What better record could be asked?"

The funeral services were held, at the former residence of deceased, on the afternoon of Feb. 2, and scarcely a business house in the city was unrepresented at the sad gathering. The bankers closed their offices at an early hour in order that their officers and clerks might be afforded opportunity to pay fitting tribute of respect to the one who had been a Nestor in their midst—an extraordinary concession for commerce to make to the memory of the dead. The burial rites of the Protestant Episcopal Church were performed with great solemnity and fervor by the Revs. Taylor and Clampit, and the pall bearers who acted as a guard of honor to their dead associate comprised Ex-Governor Jno. M. Palmer, Jno. C. Lamb, U. S. District Judge W. J. Allen, Lafayette Smith, Phillip Warren and C. A. Gehrman. The remains were entombed in the Ridgely plot at Oak Ridge.

AGAIN, THE DOLLAR MARK.

Our readers have from time to time been informed as to the progress, through the meshes of the law, of the attempt instituted by the Cleveland (O.) City Council to oblige the Cleveland Gas Light and Coke Company to sell gas at the rate of $1 per thousand cubic feet. In our last we briefly noted (the decision in full is given in the present issue) that the Cuyahoga county Circuit Court generally upheld the right of Councils of the State of Ohio to arbitrarily regulate the price to be charged for gas within their respective localities. While this decision was adverse to the Cleveland Company it did not necessarily oblige the latter to at once lower the price of its commodity to the figure determined on by the Council, because a suit brought by the city obliging the Company to come to the former's terms was still in abeyance; or, rather, was being argued on its merits before the proper legal tribunal. In this suit the Company defended its non-compliance with the ordinance on the ground, first, that the ordinance was invalid because it had been passed after two readings, whereas the rules of Council provide for three distinct readings of such measures; and, further, that the ordinance, when on final passage, did not receive the votes of three-fourths of the Councilmanic representation. Yet again the Company pleaded, in respect of certain action taken by a Council that acted in similar premises something over 20 years ago, the statute of limitations as a bar to the present proceedings. Turning aside for the moment from the live legal proceeding, a member of the City Council, in common with others, was surprised when, early in the present month, he received his gas bill for January last. From its face he learned that 3,700 cubic feet of gas had been used in his house during that month, which, to his astonishment, had been billed at $3.70, or at the rate imposed by Council. It had been the intention of the Company to reduce its charge from $1.25 to $1.20 per thousand, and in fact the Councilman's bill bore that talisman on its surface; but the force thereof had been destroyed—to a great extent, since a neat operation in red ink had obliterated the "20 cents" section. Application at the Company's offices resulted in a declaration by President Morley that the new selling rate had been placed at $1, although he held the action of Council to be illegal, and wished it to be further understood that the Company's course was voluntary. Now, to come back to the litigation. In due course of time the Court decided that the Company's defense was sound, in so far as its pleas relative to the departure from proper Councilmanic procedure were concerned. This, of course, destroyed the binding virtue of the ordinance; but the Cleveland Company must be numbered as the latest accession to the limited circle of "dollar gas" purveyors in the States. Plenty of others, however, are likely soon to join them.

[Prepared for the JOURNAL.]

How to Test Gas Meters.

By C. W. HINMAN.

It has been suggested that an account of the apparatus and methods of gas testing useful to the ordinary gas engineer would be acceptable to the readers of this JOURNAL. As the foundation of a large part of gas testing consists of accurately measuring the gas used, it has been thought advisable to begin with a description of the apparatus and manipulation necessary in meter testing.

Gas meters, to be sure, do not contain as small and delicate machinery as watches, but they must be used with a certain amount of care if they are to be used as reliable measuring instruments. It will not do, for example, to bring in a cold meter, place it immediately on the testing table, and test it at the wrong rate by a prover that leaks, has no pressure gauge or thermometer, has its tank filled with cold water, and no compensating weight. To be sure, the errors may all balance, but they are just as liable to be all the same way. In short, to make an accurate test it is necessary to know when the various conditions are right, and, if they are not right, how to make them so. It is not necessary to know just how much to allow for each separate correction, for the best way to make a correction is to do away with it.

For testing meters a meter prover is necessary, if any considerable accuracy is desired. To be sure, a good wet meter can be used to test a meter of about the same size or smaller. But the wet meter must be well made and filled with water, of the temperature of the room, to the proper level. Even with every care a test by a wet meter is not as satisfactory or certain as a test by a meter prover.

A meter prover consists of a cylindrical shell, closed at the top, and sealed by dipping into a tank of water. It is connected with the outside air, and also with the meter, by means of an inverted syphon, one leg of which reaches above the water inside the tank. The cylinder, or bell, as it may be called, is raised by a chain or cord attached to its top, and passed over a wheel. It is kept upright and guided by two or three pairs of small wheels attached to the top and bottom of the bell, and working in vertical guides extending from the bottom of the tank to the top of the frame. Sometimes the wheels on the top of the bell are omitted; the guiding being done by the upward pull of the cord or chain and counterweight. This arrangement, although it gives a little less friction, is not as stable as the ordinary form, and the bell does not come to rest as promptly after being raised. It is necessary that the bell of the meter prover should move easily and freely in the guides throughout its range of motion, so that when its valves are closed it will come to rest at some definite position. If the bell moves easily enough it will come to rest in its original position, whether it is forced up or down, the valves being closed.

The pressure given by the meter prover—usually about 1½ inch of water—is determined by the weight of the bell and the counterweight. It is highly desirable that this pressure should be constant, whatever the position of the bell in its guides. As the bell descends from its highest position, more and more water is displaced by the metallic shell, and the bell is buoyed up by just the weight of the water displaced. Thus, if the weight of the submerged part of the bell is 16 pounds, and the metal of the bell is 8 times as heavy as the same volume of water, the bell will be buoyed up by a pressure of 2 pounds. Unless there is some compensating arrangement, the pressure with an ordinary bell is from 2-10ths to 4-10ths of an inch greater when it is up than when it is nearly down. As the pressure in the bell decreases regularly as the part in the water increases, it is evident that weight must be added regularly to the bell as it descends.

There are three methods of compensation:

1st. By means of a weight attached to the wheel, so that when the bell is down the weight is on the side over the bell, but when it is up the weight revolves with the wheel to the other side. This method is only approximate.

2d. A heavy chain passing over the wheel is employed as a counterbalance. When the bell is up the most of the chain hangs from the rim of the wheel away from the bell; when the bell is down, the length of chain between the bell and the wheel has increased just as much as the bell has descended, while the length of chain hanging from the other rim has decreased the same amount. Thus, when the bell is up the weight of the given length of chain tends to raise the bell, and when the bell is down tends to depress it. If the compensation is exact, a portion of the chain the length of the bell must weigh half as much as the displaced water.

3d. The usual method of adjustment is by means of a weight attached to a cord which winds into a grooved curve as the holder moves. This

curve, which should be the involute of a circle, is usually called the cycloid. Its center is the axis of the wheel, and the cord is nearest the axis when the bell is down. The distance of the cord from the axis at any time is proportional to the distance the bell is raised. More or less weight is suspended from the cord until the bell balances in any position.

At present the compensation is effected partly by means of a metal chain and partly by the curve.

Air is admitted to the bell through a valve, which is usually either a water joint or a rotating composition valve. In making a test the air escapes from the bell through a shut-off valve, passes through a rubber hose, then through the meter, and escapes to the open air or the ventilating flue. The connection between the rubber hose and the meter is commonly made by the ordinary meter coupling, or else the rubber hose ends in a conical metal tube, which is thrust into the inlet of the meter, the joint being made tight with putty.

When the connection is made by the ordinary meter coupling there is usually a socket fitted into the end of the hose, into which the various sized couplings can be screwed. A pressure gauge connects with the rubber hose just beyond the shut-off valve. Of course, these various fittings must be air-tight.

The scale of the prover is either fixed on the bell and moves with it, while the pointer is stationary, or the pointer is on the bell and moves along the stationary scale, which is fastened to an upright. One maker attaches a rack to the bell, and the movement of the rack causes two hands to revolve on a circular dial. Meter provers are sold already graduated. This graduation is delicate work, demanding a considerable amount of care for its accurate performance. The maker's graduation is not always exactly correct, but is usually near enough for ordinary meter testing.

The meter provers generally used are either of 5 or 10 feet capacity, the larger ones being usually made with an annular tank, so that when filled with water their weight is not excessive, and the temperature can be easily regulated. It is convenient to have at least four thermometers; one in the crown of the bell, reaching inside, one in the water of the tank, one in the outlet of the meter, and one hung up in the room. All thermometers for indicating the temperature of the air must be used dry, as the evaporation from a wet thermometer bulb may lower the temperature several degrees.

Uniformity of temperature is much to be desired in meter testing, and is correspondingly hard to obtain. It does not matter whether the temperature is 50° F., or 80° F., or something intermediate, if the apparatus and meters are all of the same temperature. The construction of the meter prover itself is such that when used differences of temperature are almost unavoidable. The bell of the prover is sealed with water, and of course, in proving, as the bell descends it is wetted; when the bell is raised there is evaporation from its wet surface, unless the atmosphere is saturated with moisture. In ordinary climates the atmosphere is from 40 to 70 per cent. saturated. As evaporation absorbs heat, the temperature of the air in the bell falls. If there is a draught of air across the prover, the cooling is increased.

In order to get good light on the face of the meter and the scale of the prover, it is well to place the prover opposite the window, and not between the window and the person making the test; besides, if the prover is too close to the window the temperatures are liable to be affected.

Meters should always be left in the testing room several hours before being tested, and during the cold weather it is well to leave them overnight, taking care to maintain the room as nearly as possible at the working temperature. If the meters are in boxes or crates they should be unpacked, and if the floor is cold they should be left on tables or shelves. In the morning the first care is to bring the room, meters, and apparatus to the working temperature. The room can be cooled off by opening two or more windows at the top. The water in the tank of the holder may be heated by pouring in hot water, by blowing in steam, or by means of a gas water-heater attached to it. Care must be taken to agitate the water thoroughly, so that it will have the same temperature throughout. When the meters and prover are at the same temperature, a meter is placed on the testing table and connected with the outlet of the prover. The next thing to do is to test for a leak by stopping the meter outlet with the hand, opening the shut-off valve between the prover and the meter, soon closing it again, and noticing if the pressure on the meter remains constant. If the pressure gauge shows a fall of not more than 1-10th inch of water in a quarter of a minute, the leak is not large enough to affect the testing. If a larger leak exists, the connections may be looked at to see that they are all sound. If the ordinary connections are used, the washers should be sound, pliable, and well oiled, and the top of the meter inlet flat and smooth. A leak can be found by brushing over whatever is to be tested with thick soapsuds. The escaping air blows a soap bubble, and thus shows the location of the leak. A large leak can be felt by the hand if it is held near the escaping air. Leaks are more readily detected by using more than the regular testing pressure of 1½ inches of water. If gas is used for testing, a meter can be tested for a leak, after it is filled with gas under pressure, by going over it with a small light—a flame showing where there is a leak. Air is usually used for testing, because when gas is used it must be burned to get rid of it, and the burning gas gives out considerable heat, thus rendering constant temperatures almost impossible. There is no gain in accuracy by using gas.

After the connections and meter are made tight, the meter is run until the hand on the small testing circle at the top of the index is just opposite some mark on the circle. It is desirable that the hand move smoothly and steadily while in the vicinity of this mark, and it is not well to choose a mark that the hand covers. The eye should be placed in the same position—perpendicular to the face of the meter—both when starting and stopping the meter.

The bell is now placed so that the index is at zero, and after the proper outlet is attached, the valve is opened and the air passes from the prover through the meter. The outlets usually provided with the prover consist simply of screw caps with proper-sized orifices, a separate outlet being used for each size of meter. An outlet with an adjustable orifice may also be used to give the various rates. If this is done two or three outlets may be used for all the different sizes of meters. It is convenient to have the outlet provided with a pressure gauge and a thermometer.

The legal rate of passing gas or air when testing meters is 6 feet per hour, or 1-tenth of a foot per minute, for each light the meter is worked to supply. In other words, the rate for a one-light meter is 1-tenth of a foot per minute; for a two-light meter, 1-tenth of a foot each 30 seconds; for a three-light meter, 1-tenth of a foot each 20 seconds; and for a five-light meter, 1-tenth of a foot each 12 seconds.

While the gas or air is passing through the meter it is well to see that the thermometers in the bell and the outlet of the meter indicate the same temperature, and that the outlet pressure is fairly constant. As the testing circle is usually small, and the hand not exactly in the center and sometimes considerably at one side, it is necessary to run the meter until the hand has made one complete revolution. The shut-off valve is closed when the index hand of the meter is in exactly the position it occupied at the start. It is convenient to have an alarm bell attached to the prover and arranged to ring when nearly the required amount of gas has passed. The usual custom is to use a 2-foot circle for five-light and smaller meters, and a 5-foot circle for ten and twenty-light meters. For the larger sizes there is less uniformity of custom. Whatever the size of the testing circle the result of the test is always stated as a percentage. Meter provers are usually graduated so that the percentages can be read directly when 2 or 5-foot circles are used. The scales of provers are always graduated to tenths of feet throughout their entire length, and are easily read to hundredths by estimation. An easy calculation gives the percentage of errors. For example, suppose a small meter with a 2-foot circle has been tested and the scale of the prover reads 2.12 feet. The meter is 6 per cent. slow, as 0.12 is six per cent. of 2, and the meter has indicated less than the standard—that is, the prover.

If the temperatures of the prover and meter are different a correction of 1 per cent. can be made for each 5° difference. For example, the meter is found to be 2½° F. warmer than the prover, the meter is really one-half of one per cent. slower than the test indicates, as 100 volumes of air in the prover have expanded and occupied one hundred and one-half volumes while passing through the meter. If the meter is colder than the prover the meter is faster than the test indicates. However, it is always advisable to keep the temperatures uniform and avoid the corrections, as it is not certain that the thermometers indicate the average temperature of the air in the prover and in the meter.

It is sometimes desirable to test a meter at twice the legal rate, and notice if the pressure at the meter outlet is either deficient or fluctuating. Meters are also run at one half of the legal rate, or slower, to test for leaks in the diaphragms or valves. If the meter registers fast at the fast rate and slow at the slow rate it indicates some internal leak. As a matter of fact, meters generally seem to register too little gas when run faster than the legal rate. The results of tests of 100 dry meters that had been in use showed that, when tested at the legal rate and then at a faster rate, 60 of them registered slower at the fast rate than at the legal rate; 30 of them changed less than 1 per cent., and 10 of them registered faster at the fast rate than they did at the legal rate.

It is not necessary to test meters at more than one pressure, for the gas or air loses only a certain amount of pressure in passing through any given meter at any given rate. For example, a dry meter was run with pressures of one inch, one inch and a half, and three inches on the

prover, the rate of passing the air being kept constant. There was no perceptible change in the difference of pressure at the intlet and the outlet of the meter. The experiment was made by connecting the inlet of the meter with one leg of a -pressure gauge and the outlet with the other; the orifice regulating the rate of passing the air being beyond this last connection. By this mea the gauge showed only the difference of pressure between the inlet an the outlet of the meter; or in other words, the amount of pressure absorbed by the meter in working. When a meter is tested in this manner at different rates the loss of pressure in the meter varies with the rate at which the gas passes. For example, two different three-light dry meters showed the following losses of pressure when the gas was passed at different rates:

	Rate of Passing Gas, in Lights.				
	1 Lt.	2 Lts.	3 Lts.	5 Lts.	10 Lts.
Loss of pressure, in inches	0.07	0.09	0.14	0.22	0.56
" " "	0.12	0.14	0.15	0.24	0.70

This test also easily shows any irregularity of movement.

If a wet meter is to be tested it will be necessary to have the testing-table flat and level. The meter is to be filled with water, of the same temperature as the room and apparatus, to the overflow outlet or mark on the gauge, and then tested the same as a dry meter.

Observations on Atmospheric Electricity.

Prof. L. Weber (England), in the course of a paper read by him on this subject, explained that it was his simple purpose to offer to his audience a short report of some experiments made by him during the year in regard to atmospheric electricity. He then went on to say:

It was formerly uncertain whether the electrostatic potential would increase by rising from the surface of the earth to more elevated regions of the atmosphere or not, and also whether the potential in a normal—that is, cloudless—state of the atmosphere was always positive or sometimes negative. Sir Wm. Thomson found by exact methods of measuring that the increase of the potential with elevation is very important, and amounts to about 100 volts per meter. That fact is proved by many other observers, especially lately by Dr. F. Exner, at Vienna, who found an increase of 60 to 600 volts per meter. These observations were made by means of an electrometer. In respect of many inconveniences which are connected with the use of an electrometer, I have tried the measurements with a very sensitive galvanometer. In this case it is necessary to apply a separating air exhaust apparatus, for example, flame, or a system of points at the upper end of the conductor, which is elevated in the atmosphere. In order to get a constant apparatus I have used 400 of the finest needles inserted in a metallic ribbon. This system I have raised in the air by means of a captive balloon, or by a kite, which was attached to a conductor of twine, or to a twisted line of the finest steel wire. In this way I have attained a height of 100 to 300 meters. When the lower end of the kite line was communicating with the galvanometer whose other terminal was in contact with the earth, a current passed through the galvanometer. For determining the strength of this current I proposed to call a micro-ampere the 10^{-6} part of an ampere. At the height of about 100 meters on the average the current begins to be regular, and increases at the height of 300 meters to 4,000 or 5,000 of these units. The increase is very regular, and seems to be a linear function of the height. I have, nevertheless, found the smallest quantities of dust contained in the atmosphere, or the lightest veil of cirrus, disturbed the measurement very materially, and generally made the potential lower. In negative experiments of this nature I have made at Breslau, at the Schneekoppe, and in the "Riesengebirge," especially at the last station, an increase of potential was observed, not only by reason of the perpendicular height, but also by reaching such regions of the atmosphere as were situated horizontally about 200 meters from the highest peak of the same mountain, Schneekoppe. Therefore it must, according to Dr. Exner, be assumed that the surface of the air presents a surface of equal potential, and that the falling surfaces of high potential were stretched parallel over the plane contours of the air, and more thinly or narrow lying over all the elevated points; as, for example, mountains, church towers, etc. On the basis of these facts I think it easy to explain the electricity of thunder clouds; in fact, every cloud, or every part of a cloud, may be considered as a leading conductor, such clouds as have for the most part perpendicular height. After being induced, the change results by supposing the conduction of electricity either from the upper or from the lower side, according to greater or smaller speed of the air in the height. In the first case the clouds will be charged positive, in the other negative. I am inclined, therefore, to think that the electricity of thunder clouds must be considered as a special but disturbed case of the normal electric state of the atmosphere, and that all attempts to explain thunderstorm electricity must be based on the study of the normal electric state of the atmosphere.

Steam for Drying Water-Soaked Dynamos.

Our readers may possibly recall the fact that the St. Louis (Mo.) station of the Brush Electric Light Company suffered very severely from fire on a not very remote occasion, more damage having been done to the plant through its baptism by drenching from the hose of the firemen than happened from the action of the flames. The dynamos were almost covered by water. Despite the apparent hopelessness of the task, the proprietors of the station determined on a speedy resuscitation of the apparatus, and the following novel plan was instituted for the "revivification" of the dynamos. The water having been drained off, a steam radiator was located on either side of each dynamo, a tarpaulin being next thrown over the top, this arrangement causing each dynamo to be placed, if we may so term it, in an oven. Steam was now turned on for a period lasting 16 hours, at the end of which term the dynamos were uncovered, and found to be perfectly well dried out and in condition for active duty. Seven of the steam-baked instruments were in perfect order, the remaining one not being seriously damaged.

The Effective Use of Glue.

It order that glue should be employed to the best effect it must be given proper opportunity to penetrate the pores of the wood to which it is applied; and the more a body of glue penetrates the wood, the more substantial the joint will remain. Glues that take the longest to dry are to be preferred to those that dry quickly, the slow drying glues being always the strongest, other things being equal. For general use no method gives such results as the following: Break the glue up small, put it into an iron kettle, cover the glue with water, and allow it to soak 12 hours; after soaking boil until done. Then pour it into an air-tight box, leave the cover off until cold, then cover up tight. As glue is required, cut out a portion and melt in the ordinary way. Expose no more of the made glue to the atmosphere for any length of time than is necessary, as the atmosphere is very destructive to made glue. Never heat made glue in a pot that is subjected to the direct heat of the fire or a lamp. All such methods of heating glue cannot be condemned in terms too severe. Do not use thick glue for joints or veneering. In all cases work it well into the wood, in a similar manner to what painters do with paint. Glue both surfaces of your work, except in cases of veneering. Never glue upon hot wood, as the hot wood will absorb all the water in the glue too suddenly, and leave only a very little residue.

Jellico Gas Cannel.

The recent discovery of an extensive deposit of gas cannel in Tennessee has led to many inquiries from the gas engineers of this country relative to its location and the facilities which it possessed for reaching the market. To meet these inquiries, and for the further purpose of introducing this cannel to the general attention of the gas manufacturers of the country, Messrs. Perkins & Co., of this city, representatives of the Standard Coal and Coke Company, of Knoxville, Tenn., proprietors of the Jellico Cannel Colliery, have prepared a map, which is presented to our readers on the opposite page of this issue.

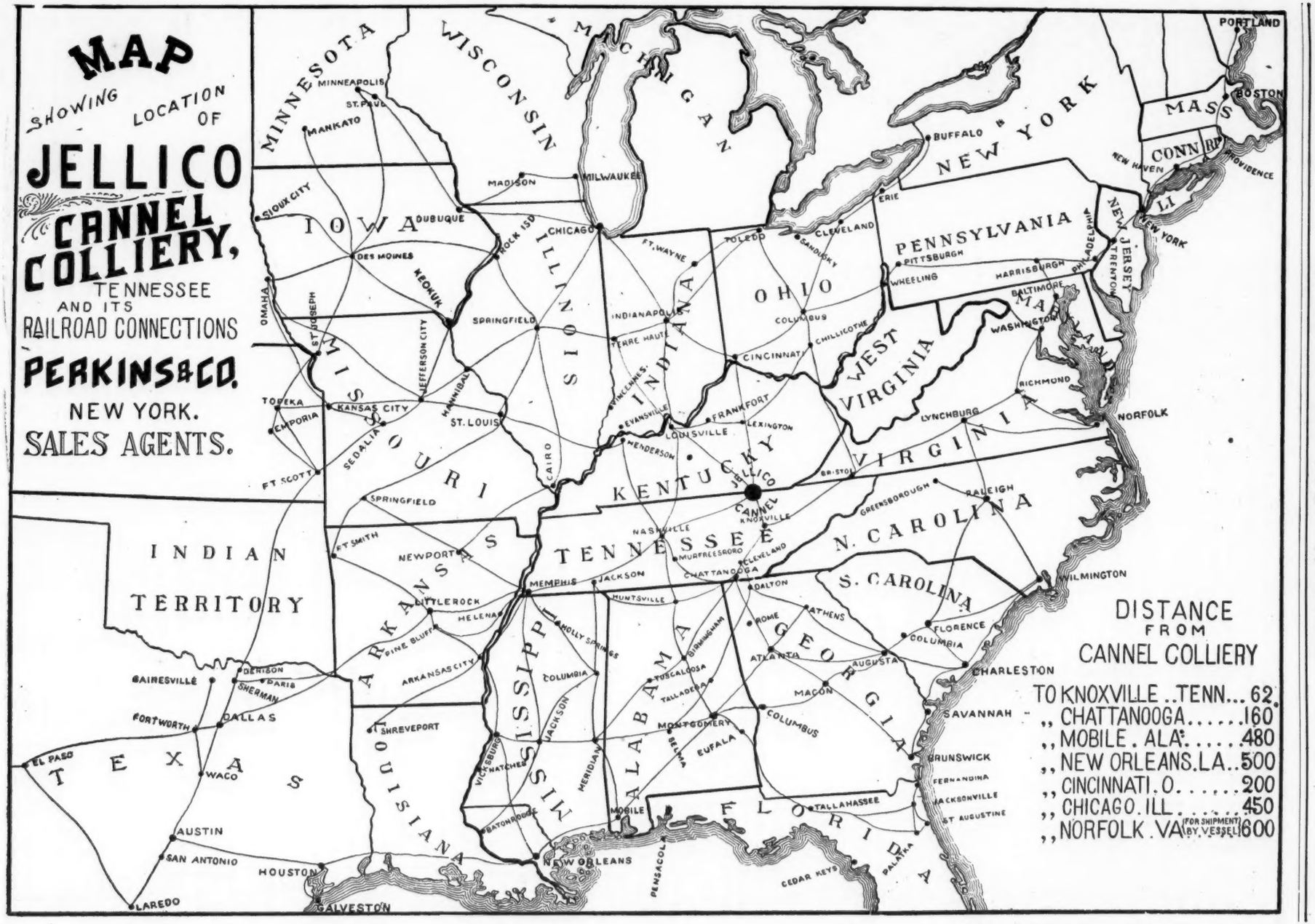
Further particulars relative to this cannel will appear in our next number. For the present it is enough to say that the colliery is a new one, the supply practically without limit (sufficient for many years to come), that the present output is 100 tons daily, which can be increased to 300 tons daily by the 1st of April next, if necessary. The quality of the cannel is believed to be second to none except, perhaps, the well-known Breckenridge.

The opening of this colliery is of special interest to the gas companies in the South and Southwest, as it places within easy reach a first-class gas cannel, available at all times by means of direct rail communication, and at a moderate cost of transportation.

Present indications point to a largely increased demand from the gas companies in the United States for a really prime quality of cannel, of such a character as will require the use of not over 8 or 10 per cent. in connection with the best caking coals to furnish a 20 to 21-candle gas, and at the same time produce a quality of coke not injurious to that derived from their caking coals. It is also important that the position of the colliery should be such as to assure a full and ample supply at all seasons of the year, and not subject to the uncertainties of river transportation solely; and it is believed that the Jellico Cannel will fully meet these requirements.

A radius of 600 miles from the Jellico Cannel Colliery will embrace all the leading gas companies of the United States *receiving supplies by rail*, every one of which is *directly accessible* from this colliery.

The colliery is directly on the line of one of the largest railroads in the country, and assurances are given of a prompt and ample car supply to meet all demands for this cannel. It will be noted that the shipping port on the Atlantic is Norfolk—the terminal point of the Norfolk and Western Railroad—accessible at all seasons of the year by vessels of any size.—*Adv.*


MAP
SHOWING LOCATION OF
JELLICO
CANNEL
COLLIERY,
TENNESSEE
AND ITS
RAILROAD CONNECTIONS
PERKINS & CO.
NEW YORK.
SALES AGENTS.
MINNESOTA
WISCONSIN
MICHIGAN
IOWA
ILLINOIS
INDIANA
OHIO
PENNSYLVANIA
NEW YORK
MASS
CONN
RI
NEW JERSEY
MARYLAND
WEST VIRGINIA
VIRGINIA
KENTUCKY
TENNESSEE
MISSOURI
ARKANSAS
INDIAN TERRITORY
TEXAS
LOUISIANA
MISSISSIPPI
ALABAMA
GEORGIA
FLORIDA
S. CAROLINA
N. CAROLINA
MINNEAPOLIS
ST. PAUL
MANKATO
SIOUX CITY
DUBUQUE
MADISON
MILWAUKEE
CHICAGO
DES MOINES
KEOKUK
ROCK ISD
OMAHA
ST JOSEPH
SPRINGFIELD
JEFFERSON CITY
HANNIBAL
ST. LOUIS
TOPEKA
KANSAS CITY
EMPORIA
SEDALIA
FT SCOTT
CAIRO
FT. WAYNE
TOLEDO
SANDUSKY
CLEVELAND
ERIE
BUFFALO
PITTSBURGH
WHEELING
HARRISBURG
PHILADELPHIA
TRENTON
NEW YORK
PORTLAND
BOSTON
NEW HAVEN
PROVIDENCE
LI
BALTIMORE
WASHINGTON
INDIANAPOLIS
TERRE HAUTE
COLUMBUS
CHILLICOTHE
CINCINNATI
EVANSVILLE
HENDERSON
LOUISVILLE
FRANKFORT
LEXINGTON
LYNCHBURG
RICHMOND
NORFOLK
BRISTOL
JELLICO
CANNEL
KNOXVILLE
GREENSBOROUGH
RALEIGH
NASHVILLE
MURFREESBORO
CLEVELAND
CHATTANOOGA
DALTON
WILMINGTON
FT SMITH
NEWPORT
MEMPHIS
JACKSON
LITTLEROCK
HELENA
PINE BLUFF
ARKANSAS CITY
HOLLY SPRINGS
MUNTSVILLE
ROME
ATHENS
FLORENCE
COLUMBIA
ATLANTA
AUGUSTA
CHARLESTON
BIRMINGHAM
TUSCALOOSA
TALLADEGA
MACON
SAVANNAH
COLUMBUS
MONTGOMERY
EUFALA
BRUNSWICK
FERNANDINA
JACKSONVILLE
ST AUGUSTINE
TALLAHASSEE
MOBILE
MERIDIAN
VICKSBURG
NATCHEZ
JACKSON
COLUMBIA
BATON ROUGE
NEW ORLEANS
PENSACOLA
CEDAR KEYS
PALATKA
GALVESTON
LAREDO
AUSTIN
SAN ANTONIO
HOUSTON
WACO
FORTWORTH
DALLAS
DENISON
DARIS
SHERMAN
GAINESVILLE
SHREVEPORT
EL PASO
DISTANCE
FROM
CANNEL COLLIERY
TO KNOXVILLE ..TENN... 62
,, CHATTANOOGA.....160
,, MOBILE . ALA. 480
,, NEW ORLEANS.LA..500
,, CINCINNATI. O. 200
,, CHICAGO. ILL. 450
,, NORFOLK . VA (FOR SHIPMENT BY VESSEL) 600

The Wainwright Gas Smelting Furnace.

The *American Manufacturer*, in referring again to this plan of working, says the Wainwright furnace has a combustion chamber into which gas and air are forced by a rotary positive blower in suitable proportions, which ignite in this chamber and ascend with perfect combustion and intense heat through the burden, reducing it into a molten condition in from 15 to 20 minutes.

One of the reasons of the failure of previous experiments in smelting with natural gas in cupolas and furnaces was the absence of a combustion chamber, perfect ignition only taking place above the charge, resulting in the chilling of the charge.

The difficulty of providing furnace bearers that could stand the intense heat and support the charge until its perfect conversion into the molten state has baffled many experimenters. Mr. Wainwright overcomes this difficulty by providing hollow pipes covered with fireclay tubes, and by forcing through them a continual blast of cold air, which takes the heat from the bearers and preserves them in a normal condition.

The inventor is able to dispense almost entirely with coke, only using a little in the first charge, afterwards charging metal continually into the furnace, so that casting can go on almost continuously.

On two occasions we spent several hours watching results of a furnace temporarily built by Mr. Wainwright at the foundry of Messrs. Wm. G. Price and Co., of Fifth avenue, Pittsburgh.

The results were very encouraging, the furnace doing its work as the inventor had predicted.

About a couple of cwt. of scrap cast iron was charged into the furnace upon a small layer of coke, and as rapidly as it was reduced fresh material was supplied to the furnace, the molten metal being tapped off at intervals.

This experimental furnace was built with a view to economy—chiefly of firebrick, and all above ground, necessitating the introduction of the gas and air at the top of combustion chamber, and forcing below and into the chamber under the burden.

Even with these disadvantages, after a little adjustment of the gas and air valves, the furnace went on famously, proving that with the construction he suggests for ordinary working, with the combustion chamber let partly into the foundry floor, and the gas and air let in at the bottom, and rising according to their specific gravity, the furnace will work without a complaint.

The ordinary cupolas, with the addition of a combustion chamber, and very little alteration can be made applicable for smelting by natural gas on this principle.

The inventor feels confident his furnace can be constructed to successfully reduce iron ore by natural gas, with 90 per cent. saving of coke. The cost of construction of his furnace, he states, will only be 50 per cent. of the ordinary ones for similar purposes.

He believes that regulated pressure of natural gas, where they have from 10 to 15 pounds pressure, may enable them to dispense with powerful blast engines, as the gas would force its own way through the interstices of the burden.

The Light-Giving Properties of Coal Gas.

The following report was recently handed in to the Gas Committee of the Aberdeen Corporation Gas Works by their Engineer and Manager, Mr. Alexander Smith. The Committee had requested that Mr. Smith prepare some facts and figures in connection with the most advantageous methods of bringing out the light-giving properties of coal gas. Mr. Smith treats the subject thus wise:

One Large Flame More Economical than a Number of Small Flames.—In order to use gas in the most economical manner for lighting purposes, it is imperative that large flames be used, and not a number of small jets, as is the common practice; the reason being that, when the volume of gas employed is below 5 cubic feet per hour at each jet, the loss in illuminating power decreases as the quantity of gas used becomes less. Thus, 5 cubic feet per hour from one jet gives a light equal to 28 candles; but if the 5 feet is divided between two flames, each consuming 2½ feet per hour, the light produced from each jet is 10.58 candles, or, taken together, 21.16 candles—being a loss of 24.43 per cent. Again, if five jets be substituted, each consuming 1 cubic foot per hour, the light produced from each jet is only 3 candles. Thus, when 28 candle gas is used, only 15-candle power is obtained for every 5 cubic feet consumed—being a loss of 46.43 per cent.

Patent Lamps for Halls, Shops, and Large Rooms.—I have made experiments with the Wenham and Fourness patent gas lamps, and find them specially adapted for lighting halls, shops, and large rooms. By consuming 10 cubic feet of gas per hour in one of these lamps, a light equal to 155.2 candles was obtained, or 15.52 candles for each cubic foot of gas consumed per hour. This result was obtained with gas which, when tested according to the method prescribed in the Gas Works Clauses Act, gives a light equal to 5.6 candles for each cubic foot; thus showing a gain of 9.02 candles for every cubic foot of gas per hour when used by these lamps, or a gain of over 177 per cent. No more striking proof of the manner in which gas is wasted, and its illuminating power destroyed, could be given. The results obtained with the Wenham and Fourness lamps are considerably in advance of those of any other gas burner.

Destructive Effect of Over-Pressure on Illuminating Power.—As regards the effect of pressure on the illuminating power, I have experimented with a flame burning 2 cubic feet per hour, at two different pressures, with the following results: 2 cubic feet of gas at 15-10ths of an inch pressure, No. 0 union-jet burner, gave a light equal to 2.9 candles; while at 6-10ths of an inch pressure, No. 2 union-jet burner, the light was equal to 7.9 candles. From these results no one can fail to see that an excess of pressure has a destructive influence on the illuminating power of gas.

Description of Burner Recommended.—As it is impossible to regulate the gas over the whole area of supply, so that each consumer shall have a uniform pressure of about 7-10ths of an inch at the burner, and as an increase of pressure means decrease of light, the need arises for a controlling apparatus, such as a governor, to prevent undue pressure. Governors in the construction and use of which leather and liquid are used have been found troublesome and expensive, and in many cases useless. I have made a few experiments with burners, with the view of taking the place of the governor on the house supply, and found the adjustable burner (which consists of two separate jets screwed together) to give most satisfactory results. A No. $\frac{3}{8}$ or $\frac{5}{8}$ adjustable burner for cannel gas of 26-candle power, consuming about 5 cubic feet per hour, would light sufficiently well a room 16 feet square; while a No. $\frac{1}{4}$ or $\frac{1}{2}$ would suit for smaller apartments. At the gas stove depot in Bridge street consumers can be shown the patent lamps and sample burners, and see them tested by the experimental apparatus.

By the kind permission of Dr. W. Wallace, Gas Examiner for the city of Glasgow, I annex the following interesting table, which he has recently prepared, showing the loss arising from the use of small jets and the want of proper regulation of the pressure:

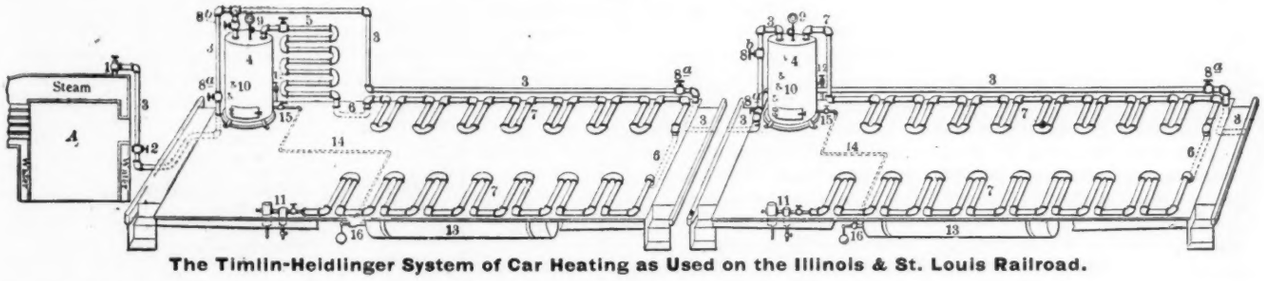
Tests with 26-Candle Gas.

No. of Jet.	At 0.5 Inch Pressure.				No. of Jet.	At 1 Inch Pressure.				No. of Jet.	At 1.5 Inch Pressure.			
	Gas per Hour.	Illuminating Power.	Illuminating Power per 5 Cu. Ft.	Loss.		Gas per Hour.	Illuminating Power.	Illuminating Power per 5 Cu. Ft.	Loss.		Gas per Hour.	Illuminating Power.	Illuminating Power per 5 Cu. Ft.	Loss.
	Cu. Ft.	Candles.	Candles	Per Cent.		Cu. Ft.	Candles.	Candles.	Per Cent.		Cu. Ft.	Candles.	Candles.	Per Cent.
	5.00	26.00	26.00	0	8	Gas	.....	.....	.....	8	Gas	.....	.....	.....
7	4.75	24.76	26.00	0	7	blows.	.....	.....	.....	7	blows.	.....	.....	.....
6	4.10	19.60	23.90	8½	6	5.70	25.60	22.46	13½	6		.....	.....	.....
5	3.25	13.84	21.30	18½	5	4.50	18.78	20.87	19⅝	5	5.55	21.90	19.73	24
4	2.85	11.97	21.00	19½	4	4.05	15.44	19.06	26⅝	4	5.00	16.62	16.62	36
3	2.35	8.98	19.10	23½	3	3.40	11.73	17.25	33⅜	3	4.30	13.67	15.90	39
2	1.70	4.85	14.27	45	2	2.50	6.74	13.48	48½	2	3.10	7.62	12.30	53
1	1.45	3.77	13.00	50	1	2.15	5.28	12.28	52⅞	1	2.85	5.47	9.60	63
0	1.15	1.96	8.52	70	0	1.55	2.35	7.60	72	0	1.80	2.45	6.80	74

The Timlin-Heidlinger System of Heating Railway Cars.

In our issue for Dec. 16 (p. 391), Mr. H. Q. Hawley asked the question "How shall railway cars be heated?" and, in answering it, he suggested that an intelligent application of gas might be depended on to at least partially solve the problem. Our attention has since then been called to the merits of the Timlin-Heidlinger car heating and illuminating device, by which compressed gas is called in as an aid to eke out steam heating in the warming of ordinary passenger coaches, under certain specified conditions. Mr. D. J. Timlin writes us that this heater is intended to meet the universal demand for some sort of apparatus which can be depended upon to warm a railway coach without the presence of any fire that could, under any circumstances, ignite the woodwork of the coach in case of accident. It is believed that this invention meets the public requirement and commends itself to railway managers as a safe and economical apparatus, readily handled without the necessity of any particular skill.

The apparatus consists of an ordinary upright boiler about 16 inches in diameter and 44 inches high, which is placed in one corner of the coach, taking up less than one-fourth the room of an ordinary stove. This boiler is fitted with a steam gauge and water cocks, and has under it a set of gas burners so arranged as to play upon drop tubes from the boiler, and produce a great heat in a short space of time. The boiler is connected with a steam pipe leading from the steam space to the locomotive boiler, and descending with a perforated end far enough down into the car boiler to have its outlet below the water-line thereof. It is also connected with a system of pipes running through the car and furnished at the further terminus with a proper water trap. The steam pipe leading from the locomotive has two valves, one connecting with the steam space of the locomotive boiler and one with the water space. This pipe runs entirely through a train, and is joined by flexible couplings such as



The Timlin-Heidlinger System of Car Heating as Used on the Illinois & St. Louis Railroad.

are now in use for air brakes. Either steam or water can be taken from the locomotive through this pipe.

As each car receives its steam supply from this pipe, and as the steam so received is put to no other use than that of heating the car into which it is received, it is evident that each car in a train can be heated, and the supply of heat therein be regulated, without reference to or dependence upon the heating apparatus in any other car of the train. This advantage is made possible by the action of the car boiler, which serves to change high pressure into low pressure steam.

The car boiler serves another and still more useful purpose. The great defect of most devices for heating cars with steam is the necessity for using fire on the car to maintain a supply of steam when the supply from the locomotive is not available. When a fire has once been built in a heating apparatus on a car it must either be smothered or removed, or remain an element of great danger in case the car moves. It has been found, however, that the car boiler in the apparatus under consideration, if partially filled with water from the locomotive, and charged with high pressure steam, before the car is detached, will furnish sufficient heat to maintain for four hours a temperature of 70° in a coach, where the temperature without is below zero. A fire once built in a car is apt to be allowed to remain by the carelessness of employees; and in such case the supposed safety is merely a delusion. In order to provide for unusual emergencies the heater is provided with the means of raising and keeping up steam by the use of gas jets under the car boiler. An ordinary gas tank containing common illuminating gas, under high pressure, is suspended under each car, and the gas is used for illuminating the car. In case of necessity the jets under the boiler are lighted. If the car is in motion and an accident happens, the gas is cut off by the turning of the car, by means of a very simple device, and when the car turns over, there is no fire of any kind about it.

This invention has been in actual use for some months on a local train of the Illinois & St. Louis Railroad and Coal Company, running from Belleville, Ills., to St. Louis, Mo., and has been fully tested. The saving of fuel, with coal at 3½ cents per bushel, has been at the rate of $54 per car per annum, while the locomotive has not increased its consumption. The cars supplied with the heater are every day detached from the locomotive for several hours at a time, and taken over the St. Louis bridge by locomotives which have no steam connections, and passengers are not able to distinguish any diminution of warmth, although the gas jets under the boiler have not been used. The cost of fitting a coach with the heater does not exceed $125, and where hot air or steam pipes are already in a coach the cost is much less than that. The apparatus can be easily managed by a brakeman, and is claimed to be absolutely safe at all times. No tendency to freeze up or to get out of order in any particular has been found in practice.

Description.—In the cut, *A* represents a locomotive boiler—1, a steam valve and 2, a water valve. When 1 is open and 2 closed steam will flow through the pipe 3, which extends through the train inside the coaches, except at couplings. When 2 is open and 1 closed hot water from the locomotive will flow through the pipe; 4 is the car boiler, which is the main feature of the apparatus. This boiler, which is 16 × 44 in., is connected with the steam and water main, 3, in the usual manner, and the connecting pipe, which has a perforated end, extends down into the boiler below the water cock 10. An ordinary steam heating pipe leads from the boiler to a system of pipes in the car which may be arranged as thought best. The cut shows an upright coil for baggage and express cars, and the ordinary bends now in use under seats in coaches. At the further end of the steam heating pipes is a water trap, 11, to permit the escape of water made by condensation: 13 is a gas tank (tanks are made of tubing, with heads welded in) containing common illuminating gas under pressure, which may be used for lighting the coach, as well as in connection with the heater, when an emergency renders it necessary.

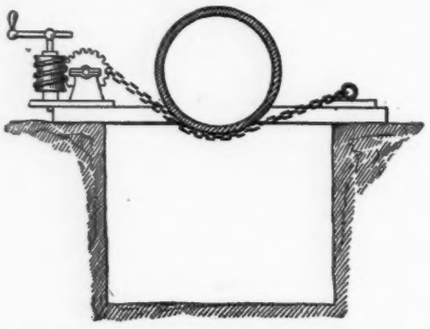
A steam gauge is shown at 9, the gauge-cocks being shown at 10—water glasses can be used—and blow-off cocks are shown at 12. From the gas tanks, shown at 13, the gas pipe (14) runs from gas tank to burners under boiler for heating purposes. At 15 is fixed the valve which regulates the supply of gas desired, 16 representing an angle plug valve which shuts off the gas should the car leave the track. A portion of the equipment not shown in the cut consists of an automatic regulating valve, whereby the gas flow is passed on to the apparatus at the pressure desired, say, between 4 ounces to 5 pounds per square inch. The gas is compressed, by means of a special compressing apparatus, in the tanks to a pressure of 300 pounds to the square inch. The tanks are 16 inches in diameter and 8 feet long—four or six of these tanks can be placed under each car.

As soon as a train equipped with this heater is made up, the steam valve 1 is opened and the steam enters the pipe 3, and flows through the pipe and couplings to the end of the last coach. The several valves, 8*b*, are then opened, and in a few minutes every coach is warm. At terminals a switch engine may be used to warm a train some time before its departure, and it will not be necessary to light the gas under the boiler at 15. In fact, although the apparatus has been in use for several months and the cars containing it were daily detached for several hours from the locomotive, it has not been necessary to light the gas under the boiler even in weather when the thermometer was below zero. When it is known that the car will be detached from the locomotive, water is let into the car boiler, if enough is not already there from condensation, until the level is above the end of the perforated steam supply pipe. The steam is then allowed to enter the boiler until its gauge shows a pressure of from 30 to 50 pounds, according to the outside temperature. This being done, the car will remain comfortable for four or five hours without any attention whatever. In case, however, of some unusual accident whereby the steam supply from the locomotive is suddenly withdrawn, or is cut off for a long time, the gas burners under the boiler may be lighted, and heat may be kept up for 12 or 14 hours without any steam from the

locomotive. In case the car is illuminated with gas, and there are no lamps in it, and an accident occurs while the car is in motion, with the gas burners lighted under the boiler, a simple-gravity cock (16) shuts off the gas when the car turns over, and there is absolutely no fire of any kind about it to endanger the lives of the passengers. No particular skill is necessary to manage the apparatus, which is as simple as a stove.

Apparatus for Lowering or Lifting Pipes in Trenches.

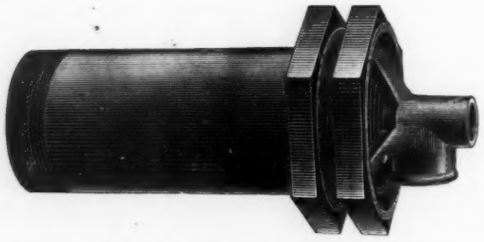
Mr. Lewis A. Boore, the thoroughgoing Superintendent of the Buffalo (N. Y.) Gas Light Company, has secured Letters Patent on a device which cannot fail to be appreciated by his brethren when engaged in main laying operations. As shown in the appended illustration the



Boore device comprises a movable frame, to be suspended over the excavation, equipped with two distinct and independent chains, one end of each being detachably affixed to one side of the frame, the other end of the chains being fastened to and adapted to be coiled upon separate drums, it being permissible to operate them severally in an independent manner by means of separate gearing and lever handles.

The Arvine Hydrocarbon Burner.

This burner, which is the invention of Dr. F. W. Arvine, formerly chemist to the Standard Oil Company, was designed to meet the requirements of a device that would, as nearly as possible, be free from the objections noticed by the Doctor in other forms of burners which came practically before his notice in the domestic economy of the huge corporation by whom he was employed. Of course, it is not well to be positive that the Arvine apparatus is perfect in every respect, but that it marks a decided advance in the practice of consuming oil for fuel cannot be gainsaid. Some months ago, or when Mr. Alexander Strecker was in charge of the Metropolitan station of the Consolidated Gas Light Company of this city, the Arvine burner was tried on a working scale at that plant, and so satisfactory did it perform its functions that the number in use was increased to six. Mr. Strecker's successor (Mr. W. B. Lundie) considers it an excellent device. By its aid all sorts of the waste products developed in the manufacture of gas, and particularly where naphtha is used as an enricher, can be utilized in the production of heat. The inventor claims that all the oily matters which accumulate in the drips of gas works apparatus can be consumed without giving off any smoke or offensive odors.



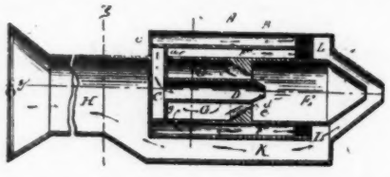
In using the Arvine burner to heat steam boilers much economy in fuel is gained, because of the nice proportion of air feed secured. All the necessary air for draught and combustion passes through the burner in immediate contact with the hydrocarbon vapors—the ashpit and fire-doors being closed—whereas, as in many other forms of burners, much more cold air must be admitted. The flame can be graduated to the dimensions of the firebox by regulating the steam feed to burner, thus preventing the disintegration of the fire walls, an objection that too frequently applies to hydrocarbon burners in general. This burner will give a short blue flame, while consuming its full quota of oil, and without the use of superheated steam. It can also be made to give a fire of dazzling whiteness, or the long, smoky, reducing flame preferred in some kilns and furnaces. The attention of a fireman and the cost of stoking and removal of ashes are dispensed with where this burner is operated, especially if the automatic regulator is used in conjunction with it. The inventor asserts that oil can be used with this burner so as to displace coal in every instance. It can be applied in satisfying every heating requirement. It will work at 20 pounds pressure, but a higher pressure will give more satisfactory results. It can be placed in any existing fire-box or furnace door. A receiver for the oil fuel is usually, for perfect safety and automatic feed, placed in an elevated tank outside of the fire-room. When steam and oil connections are made, the appropriate points for which are shown in the cut, turn on both, light up, and your fire is ready. A cheap grade of gas oil yields grand results. Besides the burners in use at the Metropolitan station, Mr. Strecker (now in charge of the Citizens Gas Light Company's works in Newark, N. J.) proposes to put them in, and the locomotives on the Brooklyn, Flatbush and Coney Island Railroad are being fitted for their use. Mr. Geo. H. Gregory, who acts as sole agent for the burner, will furnish all desired information regarding it. He can be addressed at 25 Warren street, this city.

The Cummings Hydrocarbon Oil Burner.

Letters Patent (No. 377,146) have been granted to Geo. K. Cummings, New York city, the same having been designed to protect his device for burning hydrocarbon oil, illustrated below. The inventor makes the following claims:

1. The oil vaporizing chamber divided into compartments by means of a division plate or plates, in combination with the superheating steam-chamber and mixing chamber, means for supplying the oil vapor to the mixing chamber, and an air-heating chamber, as described, the mixing-chamber and air-heating chamber terminating in nozzles.

2. The oil-vaporizing and steam-heating chambers divided into compartments by means of division plates, in combination with the mixing-chamber and means for supplying oil vapor and superheated steam thereto from the oil-vaporizing and steam-heating chambers, and an air-heating



chamber, the mixing-chamber and air-heating chamber terminating in nozzles.

3. The oil-vaporizing chamber and the steam-heating chamber, as described, in combination with a mixing-chamber terminating in a nozzle, and an air-heating chamber opening into an annular passage around the forward end of the mixing-chamber, and terminating in an annular wedge-shaped nozzle.

4. The oil-chamber *B B'*, superheating steam-chamber *FF'*, and air-heating chambers *K L*, each and every chamber having external superficial area of heating surface, in combination with means for supplying the gases to the point of combustion.

5. The oil-vaporizing chamber divided into compartments, the vapor reservoir *C*, and delivery pipe *D*, in combination with the superheating steam-chamber, divided into compartments, steam reservoir *G*, surrounding the delivery pipe *D*, and communicating with the steam superheating-chambers, a mixing-chamber, *E*, air-heating chambers *K L*, and nozzles.

6. The combination, with the oil-vaporizing chamber and the vapor-delivery pipe *D*, of the superheating steam-chamber having a frusto-conical terminal formation and an annular circular opening and the mixing-chamber having a nozzle.

7. The combination, with the oil-vaporizing chamber and the vapor-delivery pipe *D*, of the superheating steam-chamber surrounding the delivery pipe, and having a frusto-conical terminal formation, an annular circular opening, and a mixing-chamber having a nozzle with an air-heating chamber opening into an annular air-passage, and terminating in an annular contracted wedge-shaped nozzle.

8. The steam-delivery pipe having an automatic regulating valve, *r'*, as described, in combination with the oil-delivery pipe, having a valve with connecting mechanism, as described, whereby the pressure of the steam from the inlet, acting directly upon the valve *r'*, regulates the flow of oil and steam to the generator.

The Decision of the Cuyahoga County (O.) Circuit Court in the Matter of Regulating Gas Rates at Cleveland.

[In our last we referred editorially to the above-named decision. We have received so many inquiries for further details of the reasons given by the judicial authority in sustaining their decision that we herewith present the findings complete. The full bench (Messrs. Upson, Baldwin and Haynes) concur in the rulings, Judge Upson having been delegated to compile the opinion. The latter is appended.]

This is a petition in *quo warranto* to determine the right of the Cleveland Gas Light and Coke Company to charge the citizens of Cleveland the sum of $1.25 per 1,000 cubic feet of gas, in violation of the provisions of an ordinance of the City Council fixing the price of gas at $1 per 1,000 cubic feet. The question now to be determined by the court arises upon a demurrer to the second defense which is made by the defendant.

The petition sets forth the charter of the Company, the ordinance of the city fixing the price of gas, and alleges that, in violation of the provisions of that ordinance, the Company continues to charge at the rate of $1.25 per 1,000 feet. The defendant, among other defenses, refers to the charter, and sets forth the original ordinance granting the right to the Company to use the streets, and imposing as a condition the requirement that the Company shall not charge to exceed $3 per 1,000 cubic feet for gas furnished to the city and the citizens. The defendant, availing itself of the rule that upon a demurrer to the answer the court will look at the petition to determine whether it states facts sufficient to constitute a cause of action, makes the preliminary objection to the validity of the ordinance that it relates only to two companies, and is therefore not valid; that it should have been a general ordinance applying to all gas companies. The section of the statutes under which the ordinance is passed is this:

"The Council of any city or village, in which gas companies or gas light and coke companies may be established, are hereby empowered to regulate, from time to time, the price which such gas or gas light and coke companies may charge for gas furnished by such companies to the citizens, public grounds and buildings, streets, lanes, alleys, avenues, wharves, and landing places; and such gas light or gas light and coke companies shall, in no event, charge more for any gas furnished to such corporation or individuals than the price specified by ordinance of such Council; and such Council shall also have power to regulate and fix the price which such companies may charge for the rent of their meters."

The ordinance provides: "That the price of gas hereafter furnished by the Cleveland Gas Light and Coke Company and by the Peoples Gas Light Company to the citizens of Cleveland, and to the city of Cleveland for its public grounds, buildings, streets, lanes, alleys, avenues, wharves, and landings, be and the same is hereby regulated and fixed at the price of $1 per 1,000 cubic feet."

It will be seen by an examination of this section of the ordinance that it literally complies with the provisions of the section of the statute which I have read. The statute provides that "the Council of any city * * * in which gas companies or gas light and coke companies may be established, are hereby empowered to regulate, from time to time, the price which such gas or gas light and coke companies may charge for gas." The ordinance is within the strict letter of the provisions of the statute authorizing the City Council to pass such ordinances; and it not appearing from the pleadings that there are other companies between whom and the companies mentioned in this ordinance any discrimination is made by the terms of the ordinance, the court is not called upon to presume that there is a discrimination which appears neither upon the face of the pleadings nor upon the face of the ordinance. If it is true that there is any such discrimination as would render the provisions of this ordinance invalid, that discrimination should be shown by the answer, and not by asking the court, upon a demurrer, to presume that there is a discrimination which is not shown by the record. But in addition to that there is this consideration—that the validity of an ordinance is to be determined, like the constitutionality of an act of the Legislature, by its operation, and not by the mere form it may be made to assume, as stated by Judge White in the opinion of the court in the case of the State on the relation of the Attorney General vs. the Judges et al., in the Twenty-first Ohio State Reports, page 1. It therefore, in order to require the court to hold that this ordinance is invalid upon the face of it, would be necessary for the defendant to show that it does, as a matter of fact, make a discrimination, which it is not for the court to presume is made upon the face of it.

The principal question, however, which is presented by this demurrer is whether the charter of the Company, the original ordinance to which I have referred, granting the use of the streets and alleys of the city of Cleveland to the Cleveland Gas Light and Coke Company, and the acceptance of the ordinance by the Gas Company, constitute a contract, so that, by the exercise of this power of regulating the price of gas conferred upon the City Council by the Legislature, the Legislature impairs the obligation of the contract which has been entered into.

The second defense, after referring to the charter of the Company, sets forth the original ordinance granting the right to lay the gas pipes in the streets and alleys of the city, and provides, in section 3:

"That in consideratiou of the privileges granted to the said B. Barker, G. Warren, and their associates, successors and assigns, they shall furnish to said city, if required, upon the said streets, lanes, alleys, and public grounds, in and through which the leading or main pipes may be laid for the purpose of supplying the citizens with gas, such quantity of gas as may be required by the City Council for public lamps, at a price not exceeding the prices paid either in Cincinnati, in this State, or in Buffalo, N. Y., the lamp posts, meters, and lamps being furnished at the expense of the city; and shall charge the inhabitants of said city not to exceed $3 per thousand feet of gas."

It is alleged in this defense that the Company accepted this ordinance, and that they commenced and prosecuted the construction of the work and laid their pipes, and that they have ever since complied with all of the conditions imposed upon them by the terms of that ordinance; and they claim that this ordinance that they are now charged with violating is in violation of Section 10 of Article I. of the Constitution of the United States, prohibiting any State from passing laws impairing the obligation of contracts, and of Section 28 of Article II. of the Constitution of Ohio, prohibiting the Legislature of said State from passing laws to the like effect. It is claimed that the charter, the original ordinance passed by the Council, and the acceptance of the ordinance by the Gas Company, and its compliance with the conditions of the ordinance, give it the perpetual right to charge any price for gas not exceeding the sum named in the ordinance—$3 per 1,000 cubic feet of gas—without any right upon the part of the Legislature, or of the Council when authorized by the Legislature, to regulate or fix the price of gas in any other manner than that. Now, the first question is whether this charter and ordinance, and the compliance with the terms of the ordinance, constitute a contract. The rule of law, as well established, is stated by Chief Justice Waite, in the case of Stone vs. the Farmers' Loan and Trust Company, in the 116th volume of the Reports of the United States Supreme Court, on page 325. I read part of the opinion:

"This power of regulation is a power of government, continuing in its nature, and if it can be bargained away at all, it can only be by words of positive grant, or something which is in law equivalent. If there is reasonable doubt, it must be resolved in favor of the existence of the power. In the words of Chief Justice Marshall, in Providence Bank vs. Billings, 'Its abandonment ought not to be presumed in a case in which the deliberate purpose of a State to abandon it does not appear.' This rule is elementary, and the cases in our reports where it has been considered and applied are numerous. Thus, in Providence Bank vs. Billings it was held that the incorporation of a bank without any special provision for taxation did not imply a contract on the part of a State not to tax it at all. In Charles River Bridge vs. Warren Bridge, 11 Pet. 410, 548, the court said this rule of construction was not confined to the taxing power, and accordingly it held that the charter of a toll bridge company did not imply a contract not to allow the building of another bridge in the immediate vicinity which would materially interfere with its revenues."

Now, it will be observed upon examining the charter of this Company that it gives the Company the ordinary powers of a corporation, and especially the right to manufacture and sell gas, but does not in any way attempt to fix a price at which gas may be sold by the Company. It fixes no maximum. It contains no provision and no stipulation, either expressed or implied, taking away the power of the Legislature to provide for the future regulation of the price of gas to be furnished by the Company. It is true that the Legislature has the general legislative power of the State, and it is true that in many cases it may impose restrictions and limitations upon future power of legislation. To what extent that may be done is frequently a very serious question, and whether it might be done in this case or not—whether the Legislature had power to impose any limitatious upon the power of future Legislatures to regulate and fix the price of gas to be furnished by gas companies in the State—is a matter of serious doubt in my mind. But, at all events, so far as this charter is concerned, there has been no attempt to make a contract with the Company as to its future rights in that respect.

And now as to the city, what is the state of the case? In the first place, the charter of the Company gave to the corporation the right to use the streets of the city for the purpose of carrying on its business, but provided that before digging or commencing operations "the said corporation hereby created shall first give notice to, and obtain consent of the

City Council of said city for that purpose." Now, that, so far as appears to us, is the only authority given at that time to the City Council to make any contract with this Company whatever. The power was conferred upon the city to consent to the use of its streets and alleys for the purpose of laying pipes to supply the citizens of the city and the public grounds of the city with gas; and, of course, when its consent was asked for that purpose it might impose reasonable conditions precedent to the exercise of that power. But that the City Council would have the right, aside from express power conferred by the Legislature, to bind the City Councils for all time to permit the Gas Company to charge at any particular rate for its gas, or to bind the City Council not to exercise the power conferred upon it by the Legislature to regulate and fix the price of gas, it seems to us, is a proposition which cannot be maintained for a moment. It is exercising a power which could be exercised only by the Legislature itself, or by its express authority, if it be exercised in any case; and, as I have said before, it seems to us a question admitting of very serious doubt, to say the least of it, whether the Legislature itself has a right to impose such limitations upon the future Legislatures of the State. But, aside from that consideration, it seems to us perfectly clear, in looking at the terms of this original ordinance, that there was no attempt on the part of the City Council to make a contract with this Company that the price of gas should not be changed. And for that purpose it seems to us that it is only necessary to look to the terms of that section of the ordinance which is regarded as making a contract in that respect.

"That, in consideration of the privileges granted to the said B. Barker, G. Warren, and their associates, successors and assigns, they shall furnish to said city, if required, upon the said streets, lanes, alleys, and public grounds, in and through which the leading or main pipes may be laid for the purpose of supplying the citizens with gas, such quantity of gas as may be required by the City Council for public lamps, at a price not exceeding the prices paid either in Cincinnati, in this State, or in Buffalo, N. Y., the lamp posts, meters and lamps being furnished at the expense of the city; and shall charge the inhabitants of said city not to exceed $3 per thousand feet of gas."

It seems to us it would be giving a very liberal construction to that section to say that it provided not only that they should not charge more, but that they should perpetually have the privilege of charging as much as $3 per thousand feet. It is a condition imposed upon the Company that it shall not charge more than that sum per thousand cubic feet of gas in consideration of the privileges granted by the city, but not a stipulation on the part of the city that it will never exercise the power conferred upon it by statute to regulate and fix the price of gas in such a manner as to establish a lower price of gas than that named in this ordinance.

We think, upon every consideration, both with reference to the charter of the Company and to this ordinance, and every consideration o public policy, that this ought not to and cannot be held to be a contract, the obligation of which is impaired by the ordinance passed by the City Council in January, 1887, which the Company is charged with violating. The demurrer to the second defense is, therefore, sustained.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Peoria's (Ills.) Plant in Good Shape.—For its capacity Peoria can boast of the best equipped and most complete gas plant in the State of Illinois. The ammonia plant added last season has been working continuously, with the very best results. The greatly increased sendout at this place during the heaviest period of consumption, just successfully passed through, has been very (and profitably) gratifying, while the work of the electric plant (controlled by the Gas Company) has been satisfactory in the extreme. But one thing is lacking to complete the happiness of the Peoria Company's proprietors, and that would be afforded in the perfect restoration to health of Mr. Peter Coffey, to whose untiring, masterly effort the success of this corporation is alone due. The plant is a monument of his work, while the Company's relation to its consumers is a solid testimonial to his worth. We are, however, glad to say that Brother Coffey is now in better physical condition than has been the case for some years. It goes without saying that the nearer he approaches to perfect health the greater will be the pleasure of his friends—and these include everyone to whom he is known.

All Sorts of Light.—On the morning of the 11th inst. the new incandescent electric plant, constructed to the order of the Decatur (Ills.) Gas Light and Coke Company, was put in work. More than 200 lights were subscribed for at the start, the total capacity of the dynamos being equal to maintaining 800 lamps. The Decatur Company is now pretty thoroughly fortified for keeping tight hold on public favor, since it is in position to supply either coal or water gas, while those who wish electricity are free to choose between arc or incandescent lamps. Hitherto during the dark season two benches of 6's have been sufficient to cope with the output of coal gas, but during the coming summer Superintendent Stratton will add another bench to the coal gas outfit.

Danville (Ills.) Reports Progress.—Supt. Woodmansee will this season add a 10-inch exhauster to the Danville Gas Company's apparatus. As soon as the thermometer learns how to conquer its sinking spells he will renovate and enlarge the Company's office buildings, paying like attention to the workshops. Last year the Danville main system was overhauled, the result being that the works breathed easier, while Bro. Woodmansee slept sounder than was the case a twelvemonth ago. The consumers also betrayed slighter knowledge of certain emphatic words which, although enshrined in the pages of the Messrs. Merriam's unabridged edition of Webster's greatest effort, are not looked upon with great favor by those whose emotional valves are at rest. Large pipes tend to allay profanity, and thus act as preservers of the peace.

Separate Electric Light Installations.—Rumor hath it that the Otis Manufacturing Company, Ware, Mass., will introduce electric lights to their extensive works. It is also said that Messrs. Hammond & Clark, proprietors of extensive paper mills at Greenfield, Mass., will light their factories by electricity, the scheme to go into effect next April. So far, so good; but these gentlemen also intend to supply their neighbors with light from the same plant. Perhaps the Gas Commission may have something to say in regard to the legality of the second section of the Hammond & Clark scheme.

A resolution is now pending before the Newport (R. I.) City Council which has for its object a determination of the question whether the city will purchase and operate an electric lighting plant, on taxpayers' account.

During the Fort Garry style of weather recently experienced in the Eastern States naphtha and other handy solvents were in great demand. Along the Sound line "frozen" gas pipes, ditto meters, etc., were reported with monotonous regularity and depressing abundance. However, the gas men held their ground pretty well, all things considered. The automatic gas machines were completely knocked out in many instances, notably at Peterborough, N. H., where, on two different occasions, theatrical entertainments in the local opera house had to be indefinitely postponed because of the failure of the lighting apparatus.

The North Attleboro' (Mass.) Gas Light Company will put in an electric annex.

Geo. A. Steere, Chief of the Providence (R. I.) Fire Department, was somewhat injured recently while passing through one of the rooms of a building in which a fire had been put out by his men. He carried a safety fire lantern, swinging easily by his side, the metal frame of which came in contact with a severed incandescent light wire, and the shock thus conveyed was powerful enough to throw him to the floor.

Another fireman, in the person of Harry Heyman, engineer of steamer 22, Boston Fire Department, has invented an electric light for steam fire engines, the current being generated by the engine when working at a fire.

A measure introduced by Mr. Feeney during the present session of the New Jersey Legislature seeks to limit the price to be charged for gas in every city of that State to $1.25 per 1,000 cu. ft. The bill (which has the appearance to outsiders of a sight draft on New Jersey's gas makers) is numbered 177, and has been referred to the Committee on Corporations.

William G. Whipple, the Mayor of Little Rock, Ark., acting on behalf of the city, is in the market for electric lights. He asks for bids "for the furnishing and maintaining of 15 to 60 arc lights and 300 incandescent lights, and operating the same for a period of two years from the date of the contract." Bids will be received up to April 1.

Three Thousand Tons of Cannel in the Deep Sea Buried.—The ship Thomas M. Reed, chartered for San Francisco, Cal., and loaded with 3,000 tons of cannel coal, was totally destroyed by fire, while at the dock in Liverpool, Eng., on the 3d inst. Her cargo had been put on board by the Messrs. Perkins & Co., of this city, to the order of the San Francisco Gas Light Company.

Annual Election, Utica, N. Y.—Through the courtesy of its Treasurer (Mr. Keene) we are enabled to herewith present the names of those

chosen to direct the affairs of the Utica Electric and Gas Company during the ensuing year: R. M. C. Graham, President; H. Keene, Vice-President and Treasurer; H. Graham, Secretary; and Messrs. E. I. Jerzmanowski, E. N. Dickerson, Jr., W. H. Gebhard, Casimir Tag, Louis V. Bell, and Publius V. Rogers, Directors.

OLEAN, N. Y., wanted electric light, and finally induced the purveyors thereof to locate within the township. The Keystone Gas (natural) Company had been supplying the public lamps at the rate of $2 each per annum, and possibly they will be excused for thinking the price was quite reasonable. However, when the Trustees decided to adopt electricity the Keystone Company's contract with the city was about to expire, and as it would take some months to erect the necessary electric apparatus, the authorities asked the Keystone folks to stand in the gap until the new method of lighting was in readiness. The gas men agreed to do so, but they raised the rate to $6 per lamp per annum, whereupon the progressionists demurred, but without avail. They finally contracted with the Company for a three months' supply, at the advanced rate.

MORE OHIO GAS BILLS—of a legal nature, however.—According to advices dated Feb. 2, Senator Carlin has introduced to the Ohio Legislature two bills which concern the gas makers of the Buckeye State. The first measure provides that villages and cities in Ohio may own and operate gas plants on public account, the other measure being devoted to a definition of the word "gas," wherever the same occurs in the Ohio statute books. Hereafter, if the Hon. Mr. Carlin's plaint be listened to favorably, "gas" shall be construed to mean natural gas as well as the manufactured article.

A SEQUEL TO THE ROCHESTER (N. Y.) NAPHTHA EXPLOSIONS.—The Rochester grand jury, whose sessions terminated on the 3d inst., presented, among other indictments, the following: The Vacuum Oil Company is charged with maintaining a nuisance at its works, aggravated by its delivery of naphtha through underground pipes to the premises of the Municipal Gas Light Company. The latter, otherwise known as the United Gas Improvement Company, is also indicted under both names for maintaining a nuisance through the use of naphtha at its works.

CHEAPER GAS FOR JACKSON, MICH.—Treasurer Eaton, who is also Superintendent of the works, has been authorized to announce the following schedule of gas rates to the residents of Jackson. The net rate applies only to accounts that are settled within 10 days:

Monthly Consumption.	Gross.	Net.
Under 3,000 cu. ft.....	$2.00	$1.75
3,000 to 4,000 cu. ft.....	1.75	1.50
4,000 to 5,000 cu. ft.....	1.65	1.40
5,000 cu. ft. and upward.....	1.60	1.35

The Jackson Gas Light Company seemingly wants to have dealings with those whose specialty is "the enlargement of existing plants." Well, that is a praiseworthy ambition, and one not likely to lead those inspired by it into trouble. That last net rate looks extremely low for a place like Jackson. The consumers cannot fail to appreciate it.

THE proprietors of the New Albany (Ind.) Gas Light Company have made application for a renewal of their charter, and the petition is likely to meet with favorable consideration. They promise to institute a new selling schedule which will fix the maximum charge at $2 per thousand, with a rebate to consumers of large quantities. Should the desired consent be obtained, the New Albany plant, which has been ridiculously inadequate of late years to meet the drain upon it, will be at once rebuilt. The entire main system will also have to be changed to suit the altered conditions of the city. The new works will quite likely be located on ground owned by the Company at the intersection of Sycamore and East Fourth streets, now occupied as a storage place for coal. One thing which may be taken for granted is that, following the renewal of the charter, the New Albany Company's new plant will be a modern one in every sense of the term.

THE Sulphur Springs (Texas) Ice and Industrial Company has been chartered. The objects are to supply gas and electric light, water, and ice to the residents of the place named. The Company is capitalized in $30,000. Directors, J. T. Hargrave, S. W. Summers, M. G. Miller, J. M. Waller, J. J. Dobbs, and W. O. Caldwell. This place is the capital of Hopkins county, is on the East Line and Red River Railroad, and is about 85 miles east by north of Dallas.

AT the annual meeting of the West Chester (Pa.) Gas Company the following officers were elected: President, Dr. Jesse C. Green; Directors, H. P. Sharpless, Bentley Worth, H. Buckweather, E. Rogers, C. S. Bradford, Jr., and L. G. McCauley.

THE Springfield (Kansas) Light, Heat and Water Company is chartered. Incorporators, E. A. Watson, M. L. Turner, Theo. Pierce, E. M. Pierce, E. M. Campbell, and J. Wisbs, all of Springfield. Capital, $30,000. Springfield is in Mitchell county, Kansas, and is 9 miles north of Beloit, Wis.

THE local news authority says that the light given by the old kerosene lamps was to be preferred to the electric lighting so far seen at Spencer, Mass.

ANNUAL MEETING, LAKE, ILLS.—At the annual meeting of the Lake Gas Company, held on the 1st inst. in the office, 94 Dearborn street, Chicago, the following officers were chosen: President and Engineer, C. E. Judson; Secretary and Treasurer, C. F. Bryant; Directors, C. E. Judson, W. H. Ryder, J. B. Cohrs, N. C. Miller, O. S. Garther, E. Washburn, and C. F. Bryant.

ORSON G. STANLEY and others have petitioned the Massachusetts Legislature for the right to incorporate the Vineyard Haven Gas and Electric Light Company. This place is a village of Tisbury township, Dukes county, Mass. It is noted for its fine harbor.

AGENT HALLETT has been very successful of late in introducing the Siemens-Lungren high candle power burners in his bailiwick at Springfield, Mass. Two or three of the prominent retail merchants of the city have substituted the Lungren (12-ft.) burner for the arc lights formerly employed by them, and have done so with economy and satisfaction. In case any doubter who reads this would like to go behind the returns here given, let him write to Messrs. Bruce, Hauk & Co., Springfield, Mass. Mr. Hallett puts in the burners and keeps them in repair, a small rental figure (monthly) being charged for their use.

THE DOUBLE EVENT AT YOUNGSTOWN, OHIO.—The annual meeting of the Youngstown Gas and the Mahoning (Youngstown, too) Electric Light Companies was held on the 1st inst. The gentlemen selected as Directors in both Companies were Messrs. Geo. Tod, C. H. Andrews, A. B. Cornell, John C. Wick, and W. J. Hitchcock. The Board organized by naming Mr. Tod to the Presidency; Mr. P. T. Caldwell being chosen Gen. Manager, Sec. and Treas., and Mr. M. Coombs, Jr., was appointed Superintendent. It does not look as if there would be much antagonism between Youngstown gas and electric interests during the year with so many "eights" in its headpiece.

WE understand that a portion or the whole of the Allen-Harris plant which stood for so many years in the works of the old Citizens Gas Light Company, Poughkeepsie, N. Y., has been shipped to California, where it is to be once again put in duty by the owners of the Passadena gas works.

SUPT. BAXTER, of the Lima (O.) Gas Light Company, is after the authorities with a pretty knobby blackthorn. The following communication from him to the City Council explains itself: "GENTLEMEN—I am directed by the Lima Gas Light Company to say if the action taken by your body on Jan. 28, 1888—and proposed hereafter to be followed by contracts and ordinances looking to the carrying out of proposition for contract with the Electric Light Company to furnish 58 lights for $6,000—is intended to change the present contract-relations of the Lima Gas Light Company and the city, or to divert any portion of the gas fund into payments for such electric lights, that the Lima Gas Light Company desires to enter its protest against such action as being unwarranted and in violation of its contract with the city of Lima. Respectfully submitted. THE LIMA GAS LIGHT COMPANY, by A. C. Baxter, Jr., Secretary." The Lima Company's contract with the city will cause trouble for the authorities, if they persist in carrying out the peculiar electric deal recently entered into; and Baxter's blackthorn may cause some soreness amongst individual members of the electric coterie. While we are on the subject, we wish to incidentally remark that it is popularly supposed that our own Hon. Evarts is the champion single sentence writer of America; but Baxter seems able to press him hard, for while the Lima protest proper contains 115 words, only one lone period punctuates it; and that stray signal could not well have been avoided, for it comes in at the death.

THE residents of Sacramento City, Cal., are congratulating themselves on the fact that "four far-seeing young men"—at least that is the manner in which the Sacramento *Bee* puts it—have purchased the right to sell within the limits of Sacramento county an apparatus for carbur-

eting and economizing gas, the right thereof for the States being owned by "a parent company, known as the Independent Portable Gas Works Company, of Washington, D. C." We thought this and kindred schemes had been pretty thoroughly ventilated in our columns long since; but as "far-seeing young men" are fast multiplying in this country, we imagine that "near-sighted old parties" who occasionally part with "valuable patent rights," in consideration of a small cash payment, to their less ophthalmic cogeners, will continue to live on the fat of the land—and occasionally even manage to get along fairly well without the aid of eyeglasses.

FRED. BREDEL has not had much to say of late about the condition of his order book, but we imagine that his opinion in regard thereto is of an eminently satisfactory nature, for its pages show that his contracts include the following: In the first place Col. Benson, of the Nassau Company (Brooklyn, N. Y.) is about to construct a new retort house—123 feet × 64 feet—in which Bredel is to place 10 benches of 9's, and 2 benches of 18's, the double benches to be fired by one regenerator. Of course, the firing will be performed under the Bredel and Kloenne system. Col. Benson will so arrange the retort house that stoking by machinery can be adopted at short notice. The Nassau Company's new plant will be in readiness for the heavy draughts of next winter. At Milwaukee Contractor Bredel will put up ten benchs of 9's (this is a second order, the original 13 benches having answered the conditions exactly) the same to be finished towards the close of the coming summer. He will also add a condenser (1 million cubic feet capacity) to the present Milwaukee outfit. At Toronto, Canada, he will construct 12 benches of 9's, all the fireclay materials for same to be of American manufacture. Supt. Pearson expects to have these benches under fire when the American Association will meet in his city next October. At Newark, N. J., a double bench of 6's (one regenerator to do the firing) is to be installed; a bench of 5's has been put in at Elizabeth, N. J.; while Col. Armington has ordered a bench of 6's for the Brooklyn (N, Y.) Company's plant. The Kloenne tar washer, ordered some time ago for the water gas annex to the old Chicago Company's plant, has worked so satisfactorily, that Mr. Forstall has ordered two more of the same sort. These instruments are being made in this country by the Bouton Foundry Company, of Chicago. It would seem as if Bredel ought to be quite busy during the next six months or so.

ANOTHER bench contractor who has but little reason for complaint is revealed in the active person of Jas. Gardner, Jr., of Pittsburgh, Pa., who has been authorized by Director Wagner to renew 60 benches of 6's at the 25th ward station of the Philadelphia works, and 20 benches of 5's at the Point Breeze station of the same plant. He will also furnish 6 benches of 6's to the order of Supt. Sherman, of the New Haven (Conn.) works.

THE OLEAN (N. Y.) SCHEDULE.—The Olean (N. Y.) Electric Light and Power Company proposes to charge the following rates for its 2,000-candle power "nominal" arcs.

One light, from dusk to	8 P.M.	$6.00	per month.
" " "	9 "	6.50	"
" " "	10 "	7.50	"
" " "	12 M.	8.50	"
" all night		10.50	"

The rates are subject to 10 per cent. discount where two lights are used, 15 per cent. for three lights, and 20 per cent. for four or more.

A MEETING of stockholders, in interest, will be held to-morrow at the office of Dickerson & Dickerson, Nos. 5 and 7 Beekman street, this city, for the purpose "of sanctioning and approving an agreement for consolidation of the Utica Electric and Gas Company and the Equitable Gas Light and Fuel Company, of Utica, made by and between the Directors of said Companies, in the manner provided by chapter 367 of the laws of 1884." Secretary Graham did not invite the local papers at Syracuse, N. Y., and Springfield, Mass., to "please copy." The announcement might prove interesting to many persons in both the cities mentioned.

IN connection with the desire of Little Rock, Ark., to secure electric lights, it may be of interest to parties intending to bid for the work to know how the authorities have treated the proprietors of the local Pulaski Gas Light Company, who have a contract for lighting the city. On Jan. 30, the Board of Public Affairs, formally and in perfect keeping with the state of the thermometer, notified the Pulaski Gas Light Company that, acting in conformity with the opinion of the City Attorney, they would treat the existing contract with the Company as terminated on the first inst., from and after which date the city would receive no gas for public lamps or in public buildings except upon the following terms: $25 per annum for each street lamp, and $2.50 per thousand cubic feet for gas supplied to the public buildings and to the citizens, provided, however, the latter shall pay their bills within 10 days from presentation of accounts. We do not know whether the Company accepted this proposition, but are inclined to believe it was rejected. Perhaps Secretary Adams would kindly post us in regard to the matter, dropping a hint or two as to the animus of the Board of Public Affairs in the premises. In the meantime those who bid on an electric light supply ought to examine the bond with extreme caution.

BALTIMORE (MD.) LIGHTING HINTS.—From the report of Baltimore's gas inspector, as summarized in the annual message of the Mayor, we note the city last year maintained 5,277 gas lamps, 531 electric lights, and 841 naphtha lanterns. Of these gas cost $82,618.10; electricity, $107,087.80; naphtha, $17,917.15; lamp pillars, burners, lanterns, etc., and repairs cost $12,146.66, and labor (in lighting, extinguishing, cleaning, superintendence, etc.), $46,514, or a total of $266,283.71. In the year there were 91 accidents from oil lamp explosions, which were responsible for 15 deaths, 50 other persons being more or less severely injured thereby. Despite this terrible showing the inspector reports that although 6,204 samples of oil were inspected during the year none of the stuff was below the legal safety limit. The purchase of new apparatus for testing gas quality is recommended.

THE Big Rapids (Mich.) Common Council has ordered that a contract be entered into between the city and the Brush Electric Light Company, by which the latter is empowered to maintain 30 public lights (arc, 2,000-candle power), to burn from dusk to midnight, on every night in the year. The price agreed upon is $85 per arc per annum. If we mistake not Big Rapids is now lighted by oil lamps, although a pretty well-managed gas company has been operated there for quite a while.

A WATCHMAN in the employ of the Nassau Gas Light Company, Brooklyn, N. Y., came to his death in a rather peculiar manner about a fortnight ago. It is presumed that the unfortunate fellow, while somewhat under the influence of liquor, missed his footing when walking along the coping of the holder tank, fell between the tank wall and the iron of the holder and was drowned.

AN ESTIMATE IN THE "SAFETY VALVE."—The *Safety Valve* says that a careful estimate, made by an English chemist, of the contents or constituents of a ton of gas coal presents some interesting facts not familiar to unscientific minds. It is found that, besides gas, a ton of such coal will yield 1,500 pounds of coke, 20 gallons of ammonia water, and 12 gallons of tar. Now, destructive distillation of this amount of coal tar gives about 70 pounds of pitch, 17 pounds creosote, 14 pounds heavy oils, about 9½ pounds naphtha yellow, 6.3 pounds naphthaline, 4½ pounds naphthol, 2.25 pounds alizarine, 2.4 pounds solvent naphtha, 1.5 pounds phenol, 1.2 pounds aurine, 1.1 pounds aniline, 0.75 pound toluidine, 0.46 pound anthracine, and 0.9 pound toluene—from the last named substance being obtained a comparatively new product, saccharine, said to be 220 times as sweet as the best cane sugar.

A LINE FROM LAWRENCE, MASS.—Secretary C. J. R. Humphreys had his hands well filled last season in furbishing up at Lawrence, but, as the task has been satisfactorily accomplished, the comfort experienced in the knowledge that everything is shipshape more than repays him for many former free drafts on account of brain and brawn. The manufacturing plant received much attention, the additions and betterments thereto having included a "Standard" washer-scrubber of one-half million daily capacity, shafting being so arranged as to at any time permit of the addition of 50 per cent. to the present rated duty. An ammonia concentrator was also installed, and more than likely it is to that fact that the New England Association obtained the paper read before its present session, by Mr. Humphreys, "On a New Way of Utilizing Ammonia Liquor." Of course the Lawrence carbonizing department received close attention; and, *en passant*, it may be remarked that the Humphreys system of regenerative firing continues to show great results, about which more will be said at the appropriate time. Another much needed safety-valve was arranged for in respect of enlarged conduit facilities, the chief feature being the placing of a 20-inch leading main from the works. Having thus attended to the gas works portion of the enterprise, our progressionist, armed with authority from the Gas Commission to embark in the supply of electric lighting, then proceeded to equip the Company for its new departure. The Lawrence Electric Light Company, which had been operating, in a rather spasmodic way, a poor specimen of the Arnoux-Hochhausen type of arc plant, was not

averse to listening to proposals for the sale of its property. The terms having been settled, the purchasers promptly got ready an old building owned by them, fitting it up in great shape for the reception of a complete three 50-light dynamo Thomson-Houston plant, lights of the full arc pattern. The installation includes two 100-horse power Armington & Sims engines, in conjunction with two 150-horse power boilers, fired under the Jarvis plan of setting adapted to consume a low grade of fuel. Mr. Humphreys, who is not given to overstating a case, frankly admits that a fuel mixture composed of one-fourth coal and three-fourths fine breeze gives entirely satisfactory results. This, of course, is quite an item at Lawrence, where a load of coke (say 1,580 pounds) readily brings $5.50. The Company is now supplying 125 arcs, the card price for each being $10 per month—from dusk to midnight. The above shows whether or not the alert Secretary of the American Association had much time to devote to astronomical research during the past six months, save in respect to the sort of weather forcasting that aims to foretell the likelihood of an all too sudden plunge of the holder into its watery bed. It gives us pleasure to say that Mr. Cabot is as strong and sturdy as of yore—a state of things that goes to illustrate the peace of mind which contentment brings.

Mr. J. C. McMullen, well known from his connection with the *Petroleum Age* and the *Daily Oil News*, Bradford, Pa., died at his home in Bradford on Jan. 31. He was but 37 years of age; still within that brief period he had endeared himself to a legion of friends.

At a special meeting of the Directors of the Springfield (Ills.) Gas Light Company, convened for the purpose of naming a President to succeed the late N. H. Ridgely (whose worth and record are appropriately referred to in other columns of this issue), the following action was taken: Mr. Wm. Ridgely was promoted from the Secretaryship, to the office of President, Mr. Edward Ridgely being chosen to succeed the latter.

From a list compiled by J. G. Martin, stock broker, No. 10 State street, Boston, Mass., we learn that, up to the close of January, 11 gas companies whose dividends were made payable in Boston on Feb. 6, had declared semi-annual returns to their stockholders, in percentages varying between 3 and 5. The total disbursements will foot up $141,800, on a capitalization of $3,505,000, or an average return for the 6 months which is probably far smaller than that paid by any nine equally capitalized companies in the Bay State engaged in other manufacturing enterprises.

It is understood that work on the Americus (Ga.) Gas Company's plant is to be proceeded with at once. This place is the capital of Sumter county, and is 71 miles southwest of Macon. Population, about 5,500.

The Syracuse (N. Y.) Tube Works are presided over by very economical people, the President of the concern being a believer in automatic gas machines—"they furnish such a cheap, bright light, you see!" However, the President had his faith (not in the brightness but in the cheapness) in this method somewhat punctured on one of the zero evenings which visited the Onondaga valley region towards the close of last month. This conclusion is reached because, as a Syracuse *Journal* reporter puts it, every house in the vicinity of the Tube Works was, on the evening of Jan. 23, violently shaken by an explosion. "For an instant the interior of the works was *brilliantly illuminated*, and the men ran panic stricken out-of-doors." Well, we should have said the place was frightfully illuminated! The cause of the noise and the brilliance was supposed to be this. The pipe leading from the air pump in the mill to the gasoline tank outside became frozen up and finally burst. When the gasoline was turned on it leaked back into the ruptured pipe and from thence made its way into a drain leading to the sewer. At this juncture a workman passed over the drain opening carrying a lighted torch in his hand. Hence the violent, albeit brilliant illumination. The cost of the repairs would pay a pretty good-sized gas bill.

Various Mementos from our Patrons.—We are in receipt of a copy of the Laclede (St. Louis, Mo.) Manufacturing Company's calendar for current year, and the design thereof is decidedly quaint and amusing. The lithographic back-sheet contains a well-designed section of huge sewer pipe, the bell end whereof affords a stamping ground for numerous Lilliputians, whose style and dress would bring a smile even to the "austere" features of the irrepressible Moran from Joliet. We would ask Brother Dell if the unfortunate gnome, whose rapid and undignified flight from the top of the pipe betokens irreparable damage to his person, lost his balance through having just heard the bid of the Laclede Company on a proposal to supply some corporation with 100 miles of sewer pipe; the said gnome having also submitted a bid on the part of a rival house? Another handsome reckoner of Time's flight comes from the house of Nathaniel Tufts, the well-known meter maker of Boston, Mass. The monthly tables on this calendar are as handsome specimens of chaste typography and elegant presswork as have come to our notice this season. The work is fully up to an excellent quality of lithographing. Boston ought to be proud of some of her artistic printers. A third remembrance comes from Connelly & Co., Limited, of this city, in the shape of a pocket "Atlas of the World," a copy of which has been mailed to every gas company in the country. Last, but far from being least, in order, comes a decidedly handsome contribution to our picture gallery, for which we are indebted to Messrs. R. D. Wood & Co., of Philadelphia. The subject of the photographer was the modern style triple lift holder (1,600,000 cubic feet capacity) constructed last year by this firm to the order of the Chicago Gas Light and Coke Company. The view, which is of heroic size, is superbly framed, and has been accorded a prominent place in our collection.

Mr. J. H. Miller, Jr., advertises his willingness to dispose of the New Castle (Ind.) gas works. The place has 4,000 inhabitants, 83 of whom are gas consumers. The town takes 35 gas lamps. He may be addressed at the place named.

Annual Election, Dedham and Hyde Park, Mass.—At the annual meeting of the Dedham and Hyde Park Gas and Electric Light Company the following officers were elected: Directors, Messrs. J. W. Clark, J. W. Van Brunt and W. E. Fette; Treasurer and Clerk, C. A. Taft. Hereafter the town will pay for the gas actually used in the street lamps instead of the former practice of paying a lump sum per lamp per annum.

Annual Meeting, East Boston, Mass.—Directors elected: S. H. Whidden, W. L. Sturtevant, J. Thompson, F. Pease and T. J. Whidden. The Board selected the following officers: President, S. H. Whidden; Treasurer, F. Pease.

We have received copies of the annual reports of the Brookline (Mass.) Gas Company, but as the space at our present command is insufficient to discuss them properly, we will postpone their consideration until our issue for March 2.

The Town Commissioners of Oxford, N. C., have closed a contract whereby an electric plant of the Thomson-Houston type is to be put in operation there on April 15. The maximum capacity is rated at 50 arcs.

The Thomson-Houston folks would not agree to install a plant at Medina, N. Y., on the terms proposed by the authorities.

We are informed that Mr. E. H. B. Twining has ceased to act as Manager of the Chicago branch of the Goodwin Gas Stove and Meter Co.

Fremont (O.) advices are to the effect that the City Council is dissatisfied with the deal recently made with the electricians. It was agreed that the Company should furnish 30 arcs, 1,200-candle power each, on the basis of $95 each per annum, but now the Council wants 2,000-candle power lamps, and offers to pay therefor only $80. The gilding around the pill consists of a proposition to increase the number of lights to 50, but the metal seems to carry too large a percentage of brass—a composition with which the average Councilman is thoroughly familiar.

Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

Leakage per Mile of Main.

Office Rahway Gas Light Co.,
Rahway, N. J., Feb. 7, 1888.

To the Editor American Gas Light Journal:

Dear Sir—Your issue of 2d inst. contains a communication from Boston, Mass., on the subject of leakage. I am very glad your correspondent views the matter from the standpoint of "leakage per mile of main," instead of that very deceptive comparison called "percentage of loss."

The Superintendent of a small gas works, where the output is very limited and the consumers much scattered, may bend his energies toward the maintaining of fairly tight sections of street mains, but yet be obliged to report to his Directors, at the end of the year, a large per cent. of gas unaccounted for, and probably hear some uufavorable comment because another Company (with ten times the output) reports a lower per cent.

In justice to such Superintendents and their efforts it would seem but fair to count leakage per mile of main.

Our output is small and our mains spread out, with the percentage of loss seemingly high—the leakage per mile of main is *less* than 100,000 cubic feet. I call that, however, a "tolerable" leakage, or will when the figure is still further reduced. Yours truly,

Walter B. Houston, Supt.

THE AMERICAN
GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

Editor—JOS. R. THOMAS, C.E.
Asst. Editor—T. J. CUNNINGHAM
Manager—C. E. SANDERSON.

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At No. 42 Pine Street, New York.

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LIGHT, HEAT, STEAM, WATER-SUPPLY, VENTILATION, SANITARY IMPROVEMENT, AND GENERAL SCIENCE.

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THURSDAY, FEBRUARY 16, 1888.

The Market for Gas Securities.

The market for city shares remains dispiritingly dull, and the reported transactions were all at drooping figures. Consolidated declined to 75½, which figure was reached on Feb. 13th. However, there is no reason why this security should not sell at much higher prices. The increase in sendout over last year more than exceeded the most liberal estimates of its managers. In fact so great has been the demand upon its resources that another large expenditure will have to be incurred on betterment account within the next six months. Other city shares are weak and lower. Equitable, chiefly on account of the new issue of stock, has receded to about 103, while Mutual remains something like 10 points below the par mark. Investors might do far worse than to purchase Mutual at ruling quotations, and despite the seeming riskiness of such a course, we have the temerity to assert that Mutual will not be purchasable at par nine months from now. The Standard Company's parchment does not seem to be in great demand. We have also to record the incorporation of the Bay State Gas Company, of New York, the true inwardness of which move will be revealed a trifle later on.

Brooklyn shares are picking up, Williamsburgh being quoted at 114 to 117, although were the case our own we would rather pay 117 for it than part with it at 114. Nassau looks tempting at the offering price. Chicago Trusts have come down with a rattle, being quoted at less than 33; perhaps the rattle is not ready to stop ringing either. Consolidated, Baltimore, is fairly steady, as seems to be the rule with all Southern shares. The South Boston Company is now paying a semi-annual dividend of 4 per cent., and the Company's statement for the six months is an excellent one. Among recent Eastern auction sales we note 5 shares Chelsea (Mass.) gas at 112, and 5 shares Worcester (Mass.) at 137½.

Gas Stocks.

Quotations by Geo. W. Close, Broker and Dealer in Gas Stocks,

16 WALL ST. NEW YORK CITY.

FEBRUARY 16.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share. ☜

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	75½	—
Central	440,000	50	30	—
" Scrip	220,000	—	47	57
Equitable	2,000,000	100	102	—
" Bonds	1,000,000	—	113	115
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	115	118
Mutual	3,500,000	100	90	92
" Bonds	1,500,000	1000	101	—
Municipal, Bonds	750,000		—	—
Northern	125,000	50	30	—
" Scrip	108,000			
Yonkers		50	—	80
Richmond Co., S. I.	300,000	50	50	—
" Bonds	12,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	102	—
Citizens	1,200,000	20	52	54
" S. F. Bonds	320,000	1000	—	103
Fulton Municipal	3,000,000	100	128	130
" Bonds	300,000		—	106
Peoples	1,000,000	10	61	63
" Bonds (5's)	368,000	—	97	—
" " (6's)	94,000	—	100	—
Metropolitan	1,000,000	100	75	—
Nassau	1,000,000	25	—	100
" Ctfs	700,000	1000	95	100
Williamsburgh	1,000,000	50	114	118
" Bonds	1,000,000	—	111	—
Out of Town Gas Companies.				
Boston (Mass.) Gas Co	2,500,000	500	165	170
Buffalo Mutual, N. Y.	750,000	100	90	95
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	140	145
" " Bonds	45,000	—	—	—
Chicago Gas Trust	25,000,000	100	32½	—
Cincinnati G. & C. Co.	6,000,000	100	178	180
Chesapeake, Balt	1,000,000	100	86	—
"	1,000,000		100	102
Consumers Toronto	1,000,000	50	192	—
Central, S. F., Cal.			—	84
Capital, Sacramento, Cal.			57	60
Consolidated, Balt.	6,000,000	100	56	56½
" Bonds	3,600,000		107	107½
Hartford, Conn	750,000	25	—	138
Jersey City	750,000	20	—	183
Laclede, St. Louis, Mo.	2,000,000	100	118	120
Louisville, Ky.	2,570,000	50	108	114
Little Falls, N. Y.	50,000	100	95	100
" Bonds	25,000	—	100	103
Montreal, Canada	2,000,000	100	211½	212
Memphis (Tenn.) Gas	750,000	100	—	—
" Bonds.	240,000	100	103	—

Engineer Wanted.

Permanent situation open for an Engineer fully acquainted with the construction, details, and erection of gas plants. A thorough experience in shop work and estimating essential. Address, stating age, former experience, and expectations regarding salary, "ENGINEER,"
Care this Office.

Engagement Desired

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By a competent man of large experience in the manufacture and distribution of gas (coal and water) and construction of gas plants. All references furnished. Address
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1	"	3's, Palatka, Fla.
4	"	5's, Fitchburg, Mass.
2	"	5's, North Adams, Mass.
1	"	6's, Saco, Me.
1	"	5's, Georgetown, D. C.
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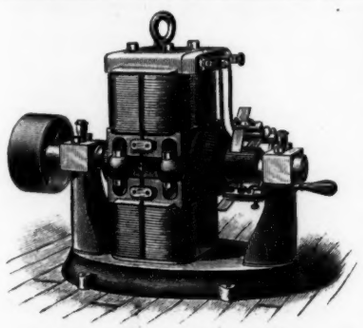

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To All Whom It May Concern!

The SIEMENS-LUNGREN COMPANY hereby warns the public against the use of various infringing Regenerative Gas Lamps which are offered for sale. This Company has heretofore delayed bringing suit to enjoin the manufacture or importation of such infringing lamps, solely because of the practical worthlessness of the infringing devices; and although, in each instance, they infringe some one or more of the various patents owned or controlled by this Company, they have fallen into disuse sooner than any suit could be brought to a hearing. As, however, the introduction of these infringing lamps has tended to discredit the practicability of our Company's system of regenerative gas lighting, we have instructed our Attorneys, Messrs. Geo. Harding, C. S. Whitman, and Silas W. Pettit, to give notice that legal proceedings will in future be taken against all such infringers.

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The following Engineers have personally given permission to refer to them:

G. C. Trewby, Esq., Engineer-in-Chief of the Gas Light and Coke Co., London. The manufacturing plant at Beckton is built in complete sections of 3,000,000 cubic feet capacity each. A Walker Tar Extractor has been fitted to each one of these sections. This was done after a long and thorough trial on one of its sections. The Tar Extractar has been supplied to other works of the Gas Light and Coke Co., including those of which John Methven, Engineer of the Gas Light and Coke Co. at the Nine Elms Station, is in charge. Also to G. E. Stevenson, Peterborough Gas Works; B. Green, Mitcham and Wimbledom Gas Works; W. H. Smith, Bedford Gas Works; F. Linging, Norwich Gas Works; J. T. Browning, Colchester Gas Works; S. B. Darwin, Portsmouth Gas Works; J. McCrae, Dundee Gas Works; W. J. Wells, Stamford Gas Works; J. M. Darwin, Longton Gas Works; J. Paterson, Warrington Gas Works; and J. Coulter, Esq., of the Dundalk Gas Works.

Also to the Engineers of the Imperial Gas Association at Antwerp, Amsterdam, Brussels, Frankfort-on-the-Main, and Aix-la-Chapelle Gas Works; to Dr. T. H. Van Doesburch, of the Rotterdam Gas Works; A. F. Spruyt, Esq., of the Utrecht Gas Works; M. Mallema, Esq., of the Zwolle Gas Works; G. Deronde, Esq., of the Leeuwarden Gas Works; the Engineer of the Kampen Gas Works, Holland; C. Pouchain, Esq., of the Gas Works at Rome, Italy; and to A. Normanton, Esq., of the Campinas Gas Works, Brazil.

Mr. Charles A. Gerdenier, Superintendent of the Bridgeport (Conn.) Gas Light Company, writes as follows, under date of Dec. 3, 1887:

"The C. & W. Walker Tar and Carbonic Acid Extractor has been in operation at these works for the past six weeks, and is an unqualified success. It removes every particle of Tar from the gas in once passing through the apparatus and a large percentage of the Carbonic Acid. I also feel quite sure that it prevents the formation and deposit of Naphthaline, because since I started the Washer I have had no stoppages from this cause. These works have been seriously troubled with Tar for many years, and I have used several kinds of apparatus and every expedient which has come to my attention for dealing with the difficulty, but without success. The Walker apparatus occupies comparatively small space, is less expensive than other systems, and requires but little attention. I carry 2½-inch seal, and have an automatic tar delivery valve. This Tar Extractor is indispensable to gas makers."

Mr. Thomas Littlehales, of the Hamilton (Ontario) Gas Light Company, writes as follows, under date of Dec. 28, 1887:

"Last summer we erected at these works a C. & W. Tar and Carbonic Acid Extractor, which is doing really excellent service. It works admirably, diminishing the duty of the purifiers and allowing them to run longer, purifying more gas per bushel of lime."

I have taken the Agency for the United States for this apparatus, and am now prepared to make contracts to erect it on the premises of any Gas Company. It can be manufactured in the following sizes:

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No. 3		**250,000**	"	"	"	"	**5**	"	"	"
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No. 5		**750,000**	"	"	"	"	**7**	"	"	"
No. 6		**1,000,000**	"	"	"	"	**8**	"	"	"
No. 7		**1,250,000**	"	"	"	"	**9**	"	"	"
No. 8		**1,500,000**	"	"	"	"	**10**	"	"	"
No. 9		**2,000,000**	"	"	"	"	**12**	"	"	"
No. 10		**3,000,000**	"	"	"	"	**15**	"	"	"

This Tar Extractor will perform its work with about one-fourth the usual back-pressure heretofore required. It is simple in construction, and can be supplied at a very reasonable price—less than any other ever before introduced. Satisfactory results will be guaranteed in every instance.

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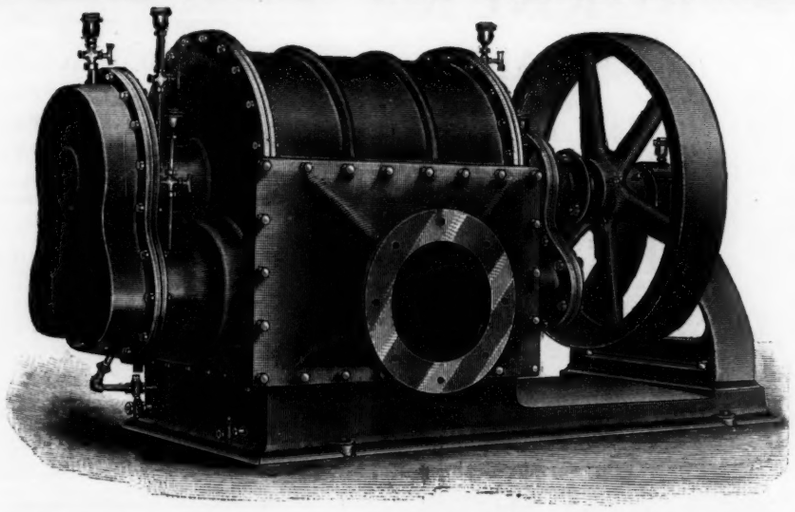

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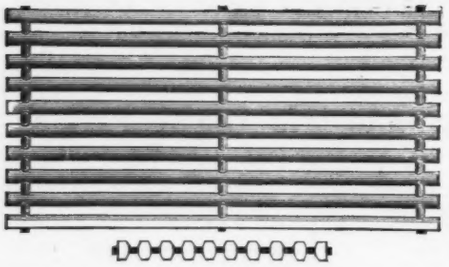

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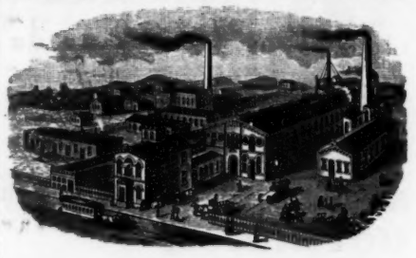

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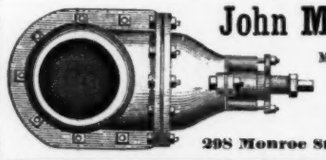

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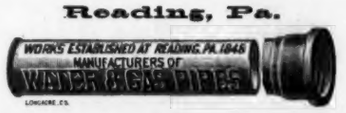

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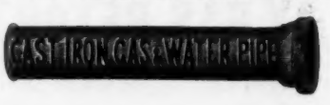

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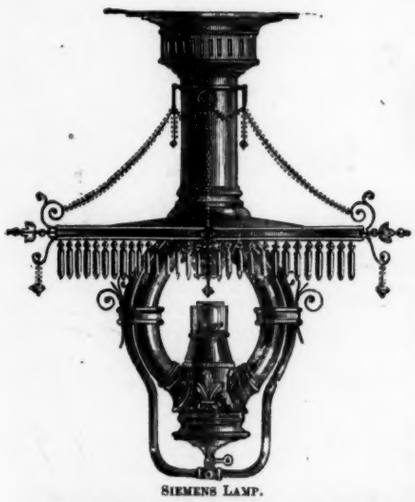

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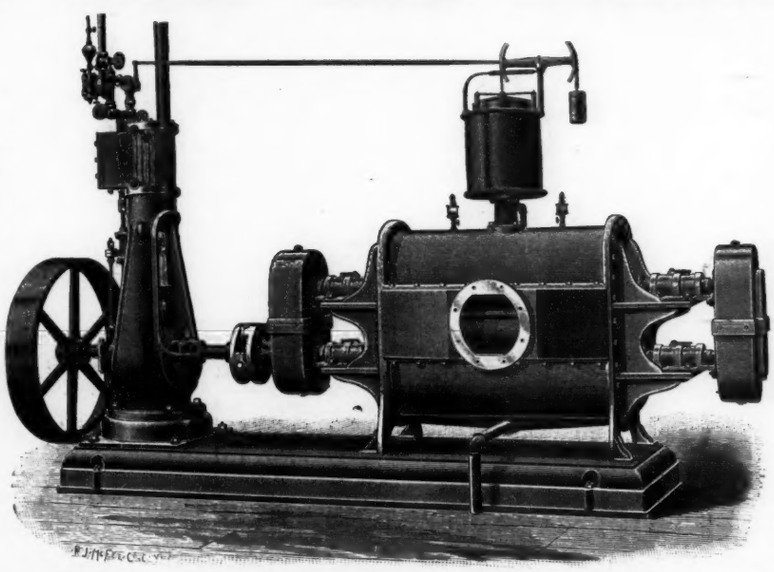

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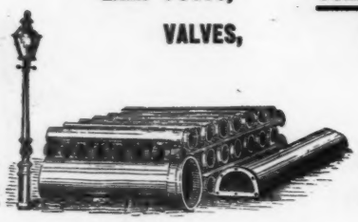

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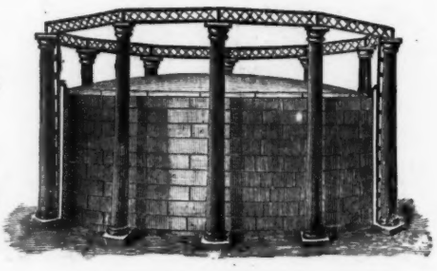

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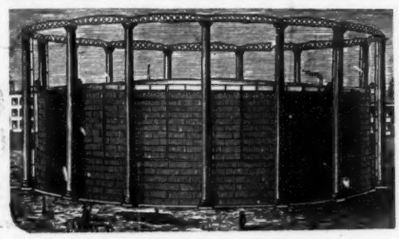

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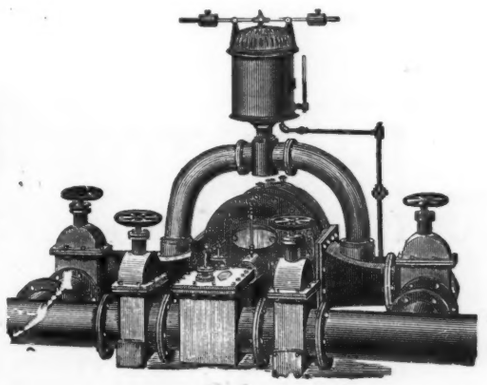

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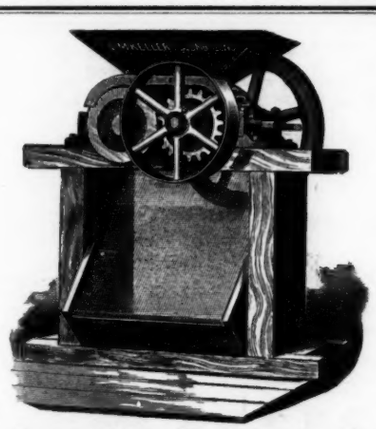

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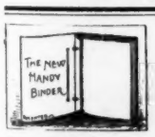

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